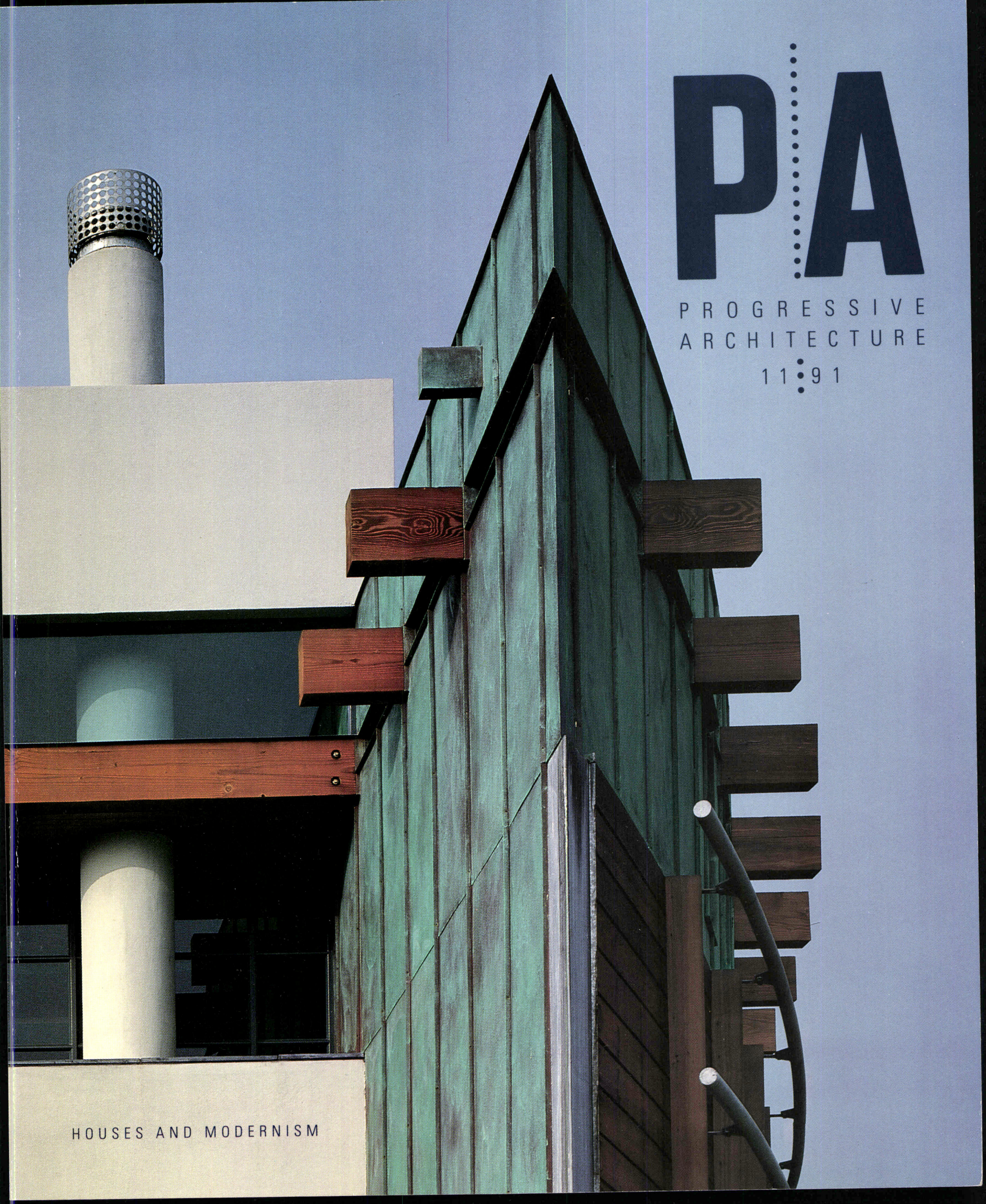

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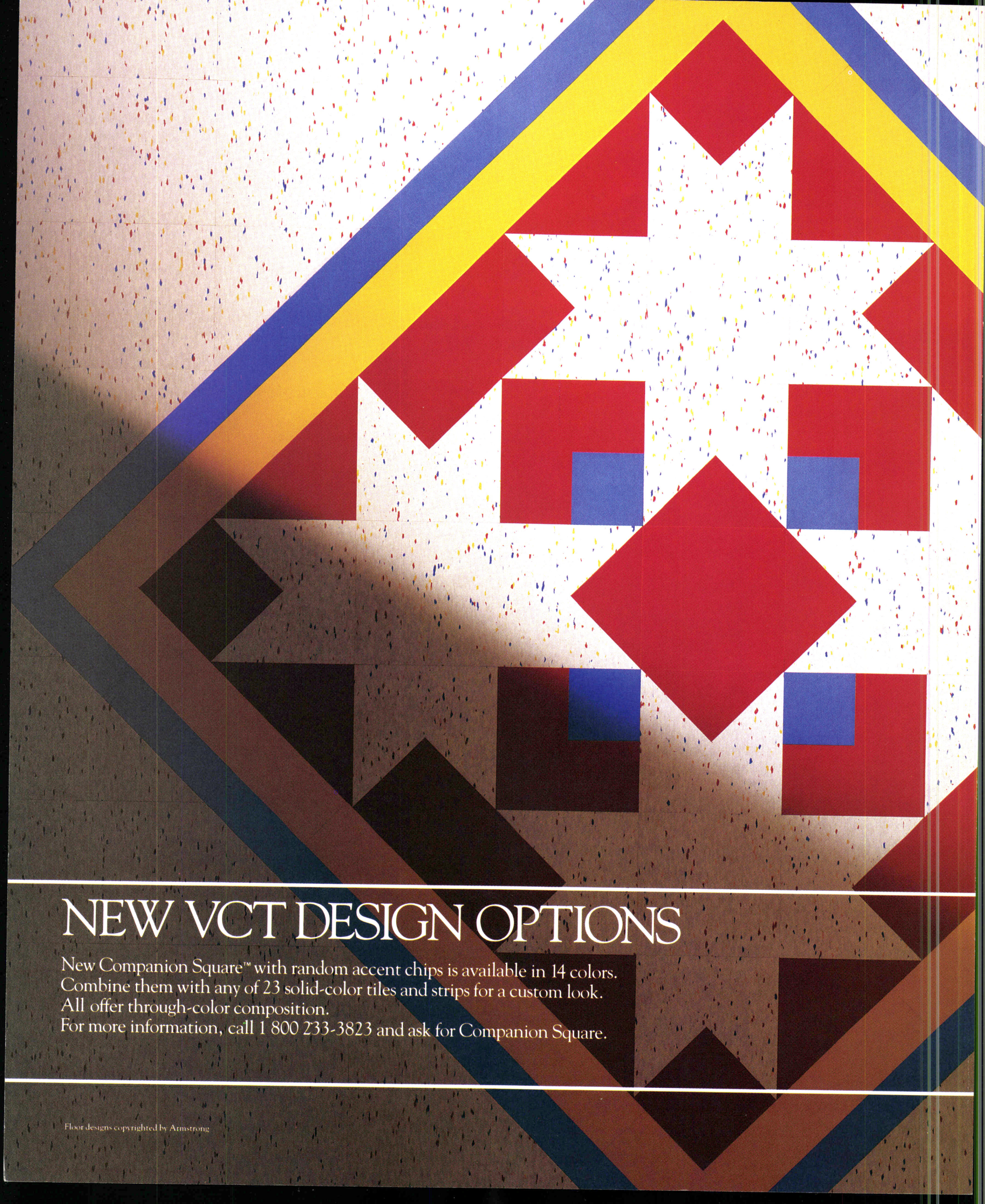
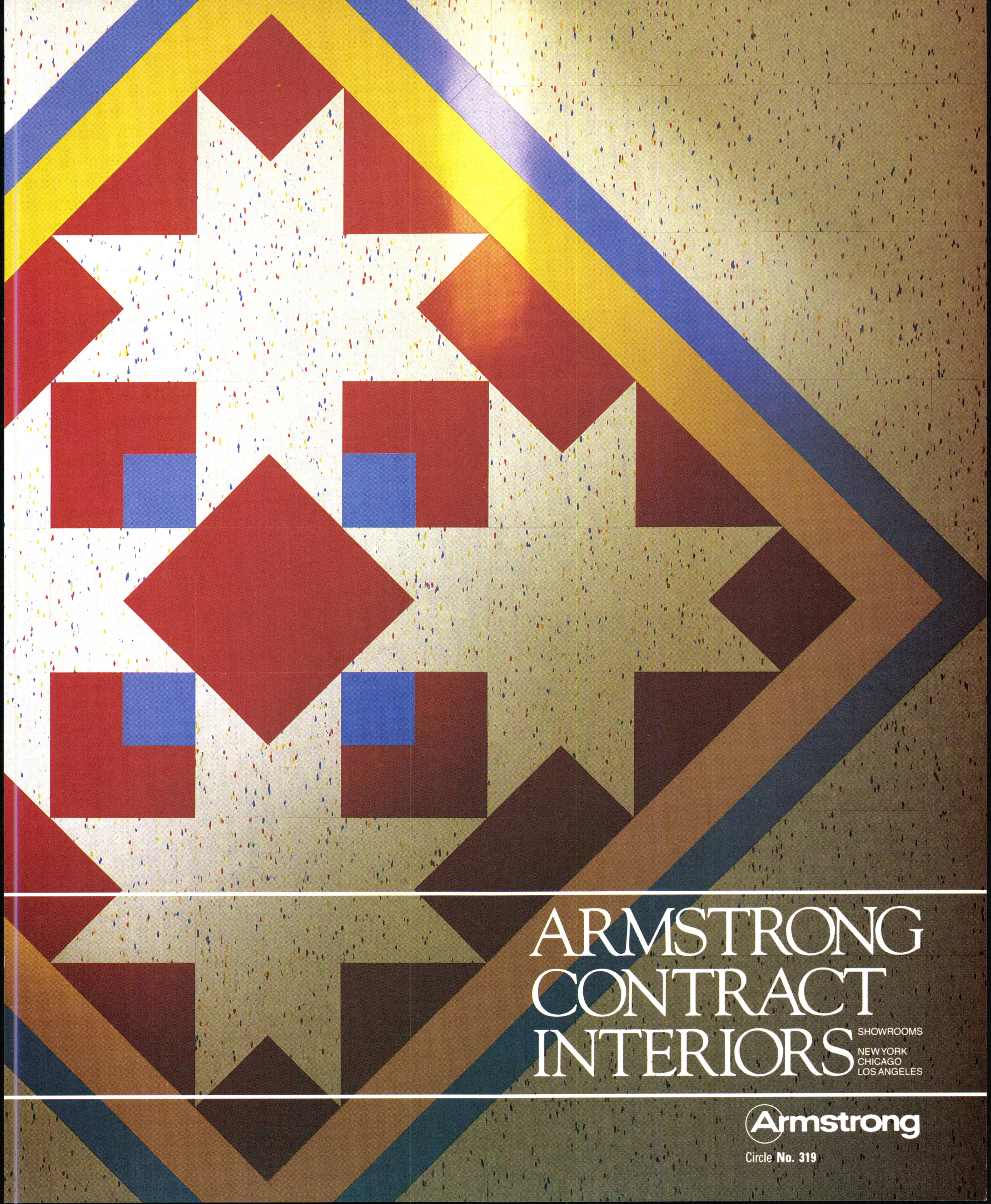
PROGRESSIVE ARCHITECTURE

11•91

HOUSES AND MODERNISM

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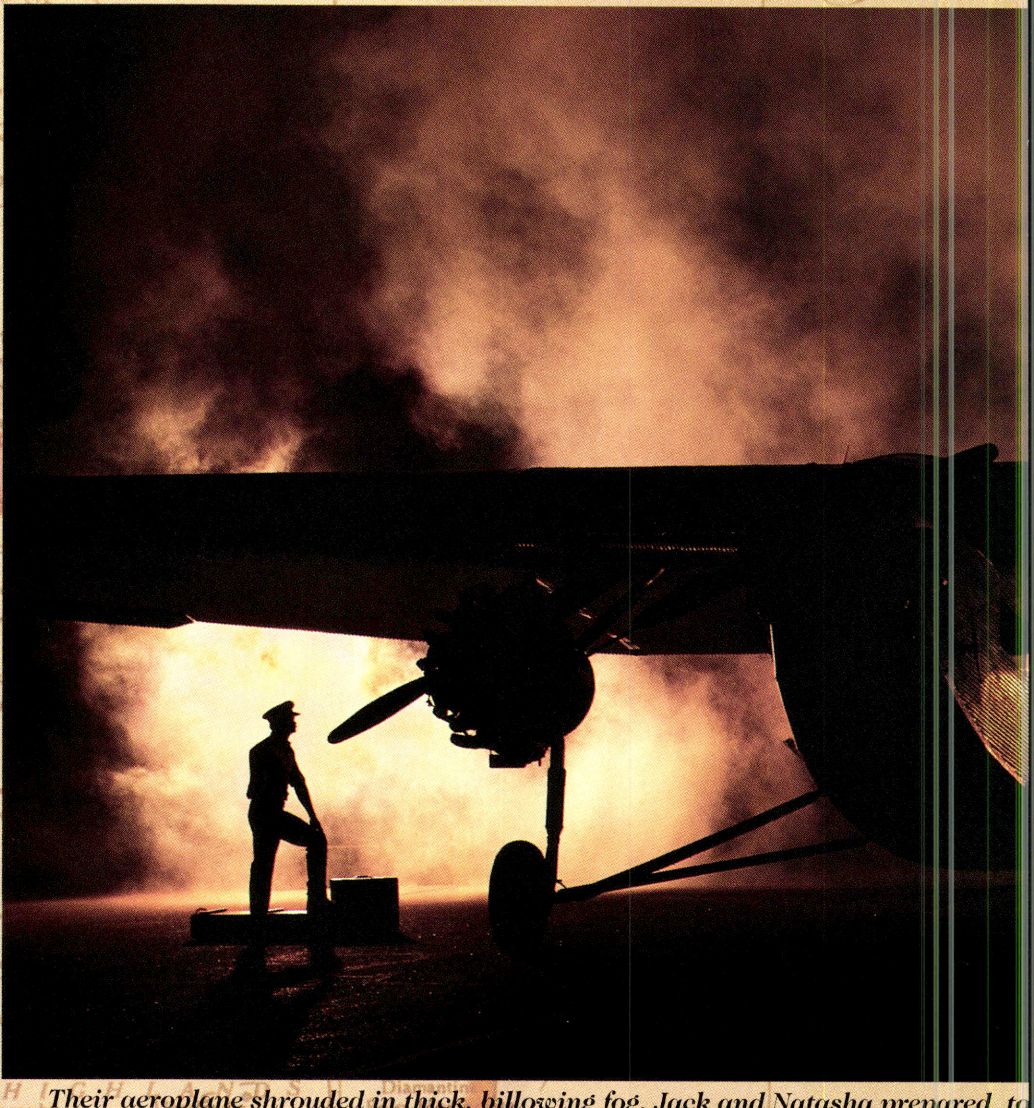

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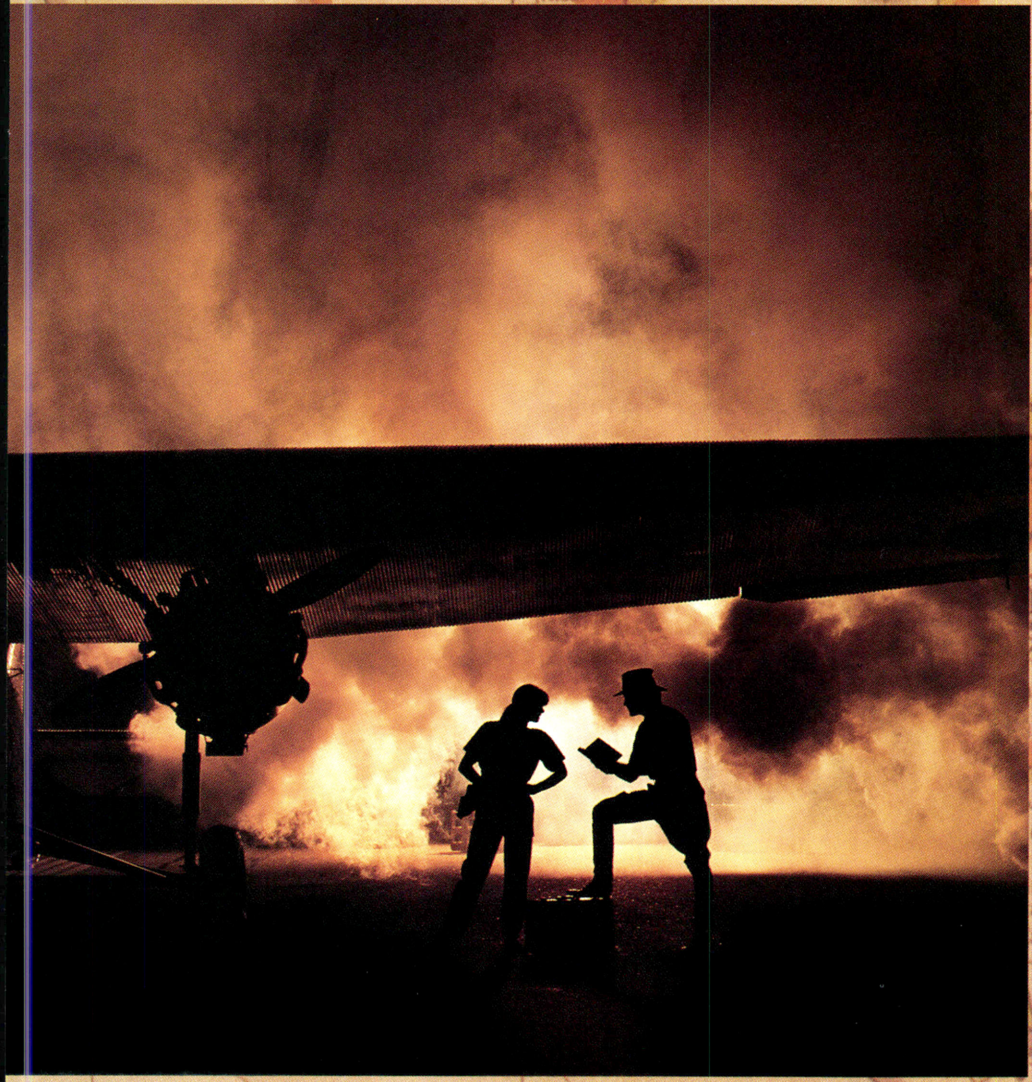

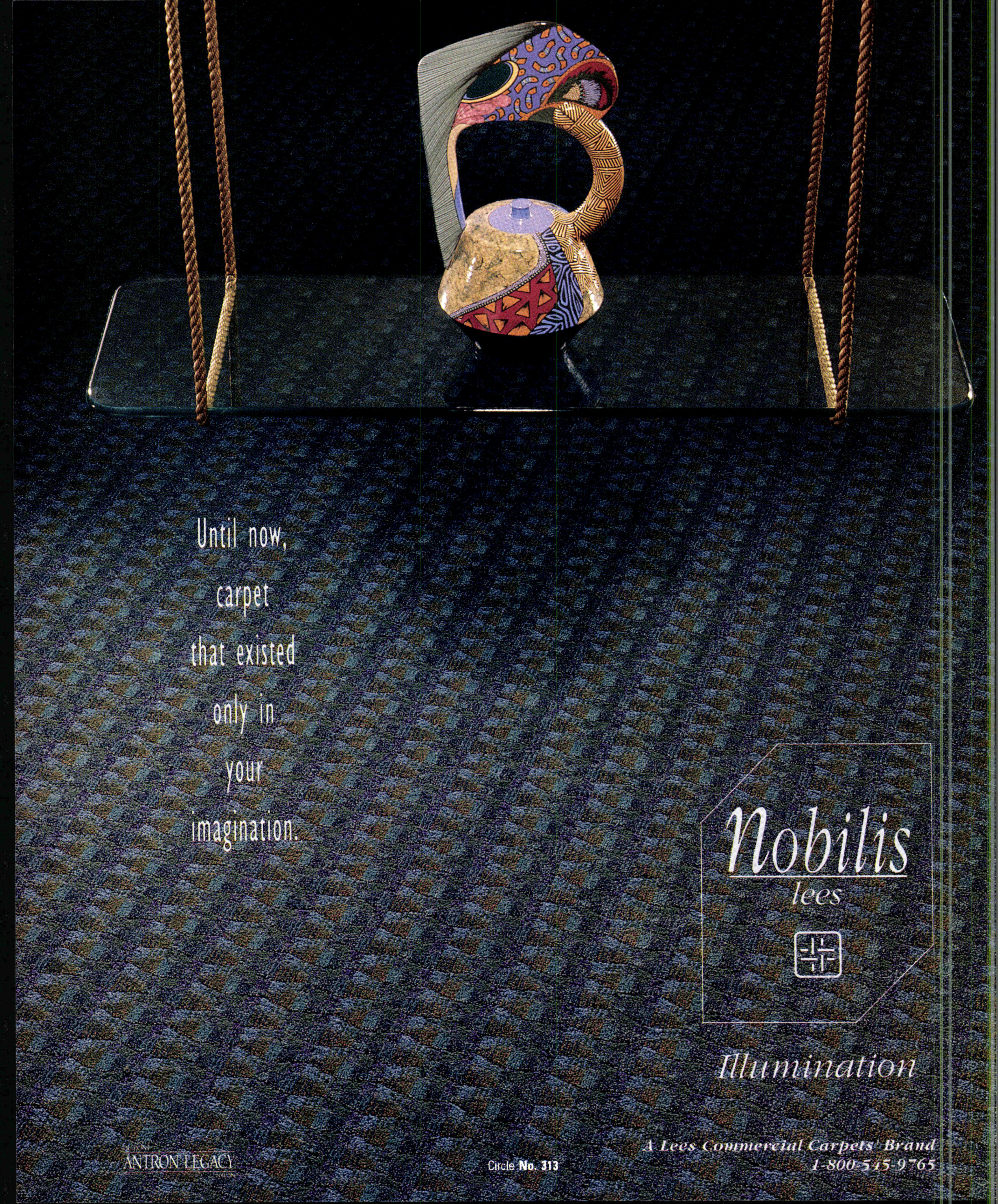

Circle **No. 313**

Progressive Architecture November 1991

P/A

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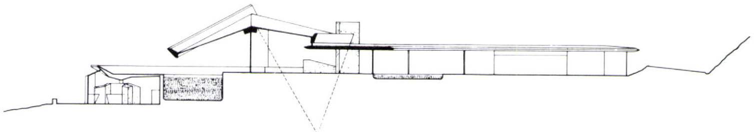

John Lautner's Goldstein House, p. 88.

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Circle No. **345**

Editorial
A Decent Place To Live

With a reorientation of national research agendas, we could find ways to bring decent housing within reach of all citizens.

The right to a "decent place to live" and a community which provides a "fit environment" is an implied contract between citizens and the government. Yet thousands of homeless people live in our streets, and millions cannot buy into the housing game – a form of speculative investment tied to private property. In the United States, a long tradition based on this "property right" of buying at one price (usually with a hefty mortgage) and selling at another (usually higher) price has reaped positive results for those lucky enough to play the game. Many of us at or near retirement age have this appreciation as our nest egg.

However, young people with modest incomes are increasingly aware that something is wrong with the way the housing game is being played. Men and women living alone now constitute 24 percent of all households, and single-parent families keep increasing every year. One income at the national average is not even close to making possible the purchase of the average house. At the end of last year there were 300,000 residential loans in foreclosure nationwide and 1.7 million delinquent loans, marking the end of the dream of ownership for those who tried the housing game on marginal incomes. The resulting impact on savings and loan institutions and banks is now well known.

One strategy for resolving this dilemma would be to lower the price of houses while maintaining incomes. Many architects like to believe there is a design solution to affordable housing. However, a "typical" three-bedroom house in the Washington, D.C., area selling for $200,000 includes $60,000 for the finished building lot, $45,000 for the developer's overhead and profit, and only $95,000 for the cost of constructing the house. If the design solution (e.g., making the rooms smaller, less elegant, or prefabricated) saved 50 percent of the carpentry labor, this would be a difference of only 1½ percent of the total cost. There is little or no incentive for the builder to price the house for less than $200,000 if that's what the market is prepared to pay.

Research, as presently constituted, is also unlikely to make any substantial difference. Most building industry research is devoted to making minor improvements in building materials, equipment, or construction methods. Academic research, dominated by the paradigms of the physical sciences (i.e., physics, chemistry, and electronics research), seldom addresses housing issues. Building industry groups have exerted pressure on federal research support to keep it within narrow limits unlikely to upset the "delicate balance" of housing markets.

A major shift in research support, characterized by a genuine desire to reduce not only the cost of housing but the price to the consumer as well, could make a difference. Areas addressed could include the basic rules and regulations governing the use and ownership of land, the provision of infrastructure as a public service, and the size, shape and aggregation of dwelling units attached to the infrastructure (not to a parcel of land). Such research might well identify ways to grant housing rights to a broader base of citizens, without forcing difficult economic adjustments on those whose life savings are invested in a house.

However, the national building research agenda is unlikely to change without a shift in our political will. The U.S. has devoted about 75 percent of the nation's research budget over the past 40 years to weapons, space, and nuclear energy. The so-called "peace dividend," based on a reduction in military arsenals, seems to shift in and out of focus, but may emerge from a change in political will. Public support for a reduction in the size of the space program could release more revenue. Even nuclear energy advocates are prepared to examine a long-term reduction in their research programs.

Changing the direction of national research priorities to focus on affordable housing means enlisting the enthusiasm of the hundreds of companies and thousands of skilled researchers whose futures are presently tied to development. If architects could use their influence to gain this cooperation, Congress might well recognize the political advantage of meeting its obligation to provide housing rights and, at the same time, to assist the military/space/nuclear industry in finding new markets. Architects and the research community working together, could, in the best American tradition, turn a problem into an opportunity.

John P. Eberhard ■

The author is a professor and head of the Department of Architecture at Carnegie Mellon University; he has been president of the AIA Research Corporation and director of the Institute for Applied Technology, National Bureau of Standards.

Views

September Issue Appraised

I sat down to read your editorial in the September issue and got up late in the afternoon, having devoured the whole thing!

Congratulations; it is one of the best issues you have produced in recent years (or anyone else, for that matter). It is multi-textured, highly informative on many aspects of design, and frequently pungently opinionated.

Your editorial on the Bush administration's dropping the ball on the Seville Expo is right on. The coverage of interiors projects in the main section is for the most part deftly handled, seldom descending to mere reportage (in particular, the piece on John Young's London apartment by Deyan Sudjic). And the articles on The Independent Group and The Situationists reveal ideas and concerns which should be re-explored by today's silly-headed stylists.

The layouts and graphics in September are also commendable – a great advance over the capricious overlays and tarted-up tricks you were giving us in recent years.

If you can keep up to the mark of this issue in the future, you will be doing a great service for the design and planning professions.
Jim Burns
Take Part, Community Design Consultant
San Francisco

HHPJ and Heidegger

Your terrific piece on Holt Hinshaw Pfau Jones in the July issue (p. 72) got my ontological juices flowing. Martin "nostalgia" Heidegger as a pro-20th-Century-technology reference? Wes Jones's peculiar reading of The Question Concerning Technology (perhaps yours also) makes sense to me only if this is layered onto it: Nothing builds human solidarity like the shared threat of danger. In fact, Richard Rorty argues, nothing else does; only sympathy for a fellow sufferer can provide a common ground. Thus, by creating a sense of unity in the face of its dangers, technology also can heighten the sense of being-in-the-world.

The issue of Heidegger's position on technology relates directly to his central theme of modern crisis – the sense of living in a derelict present – and it is this theme which I find more intriguing about Heidegger. The idea of architecture as shelter from crisis and danger has become a constant preoccupation for me both in my writing and in my practice. In my search for so-called universalities of form and culture, I have found only local, site-specific things radiating from one center: safety from danger, prevention and removal of suffering, avoidance of evil.

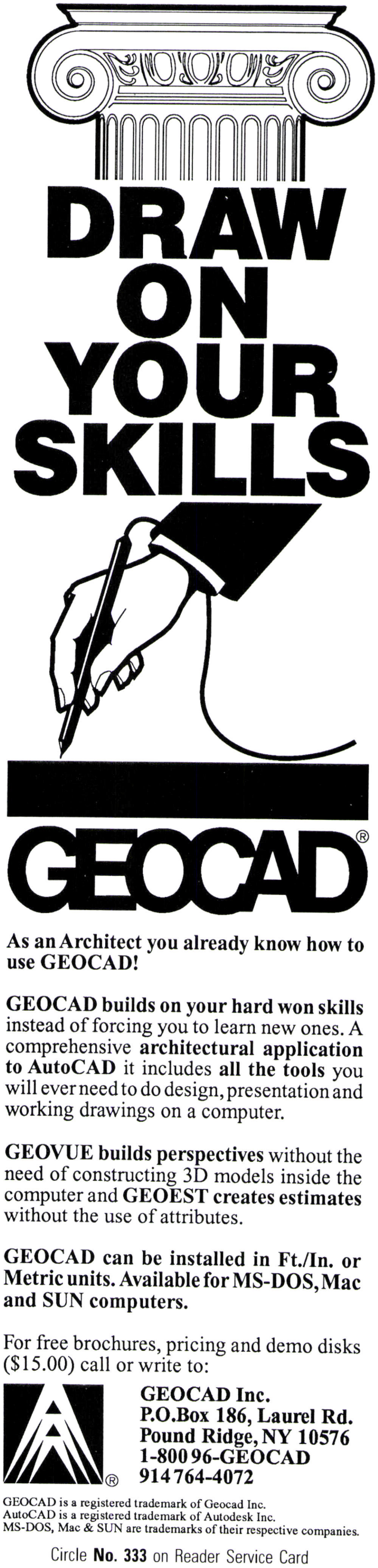
Sadly, much current architecture relishes the dereliction and the dangers of our present. If HHPJ present challenges beyond conventional deconstructivism or high-tech, it is because there is constructive provocation in their buildings. The anthropomorphic and animistic character of their work makes the threat – and the poetry – of technology palpable, not just abstract. These are works of art that admonish about present dangers from which they regrettably provide no shelter; they are tectonic foghorns. And like the Imperial Walkers in The Empire Strikes Back or the metamorph in Alien, these are machines/organisms in which we can recognize the ultimate source of terror – ourselves. Maybe this is what [Tom Fisher], Wes Jones and dear old Martin had in mind.
Raul Rosas, Architect
New York

Washington State Credits

The winning team in the design/build competition for the State of Washington Department of Ecology Headquarters in Olympia (P/A, Aug. 1991, p. 24) includes Gensler & Associates, Architects.

CAD Falsity

The photo of the "CAD Reality" (P/A, Oct 1991, p. 123) was supplied by Perkins & Will, but does not depict their offices.



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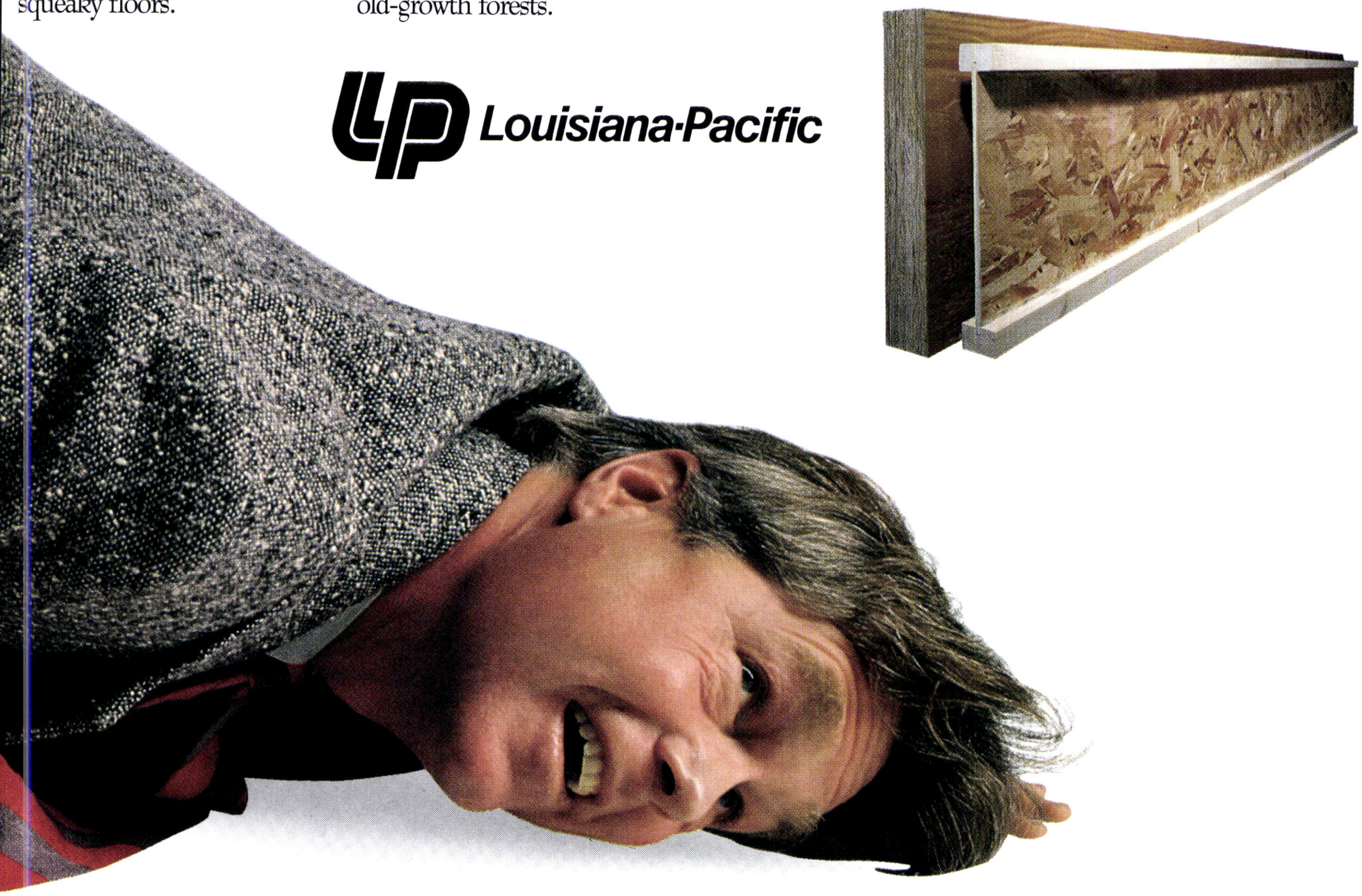

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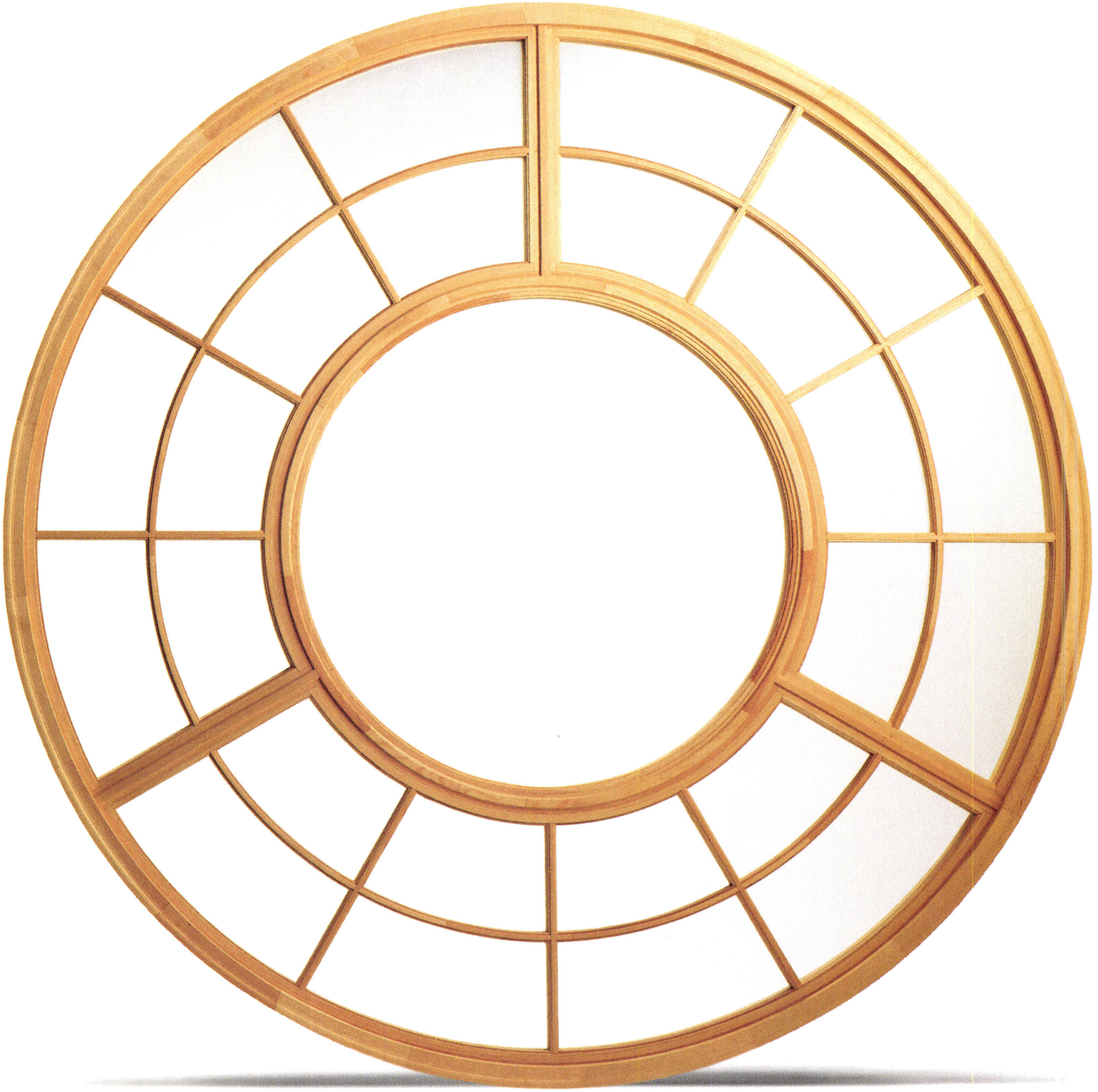

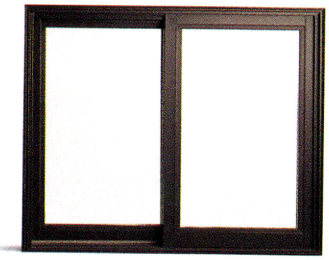

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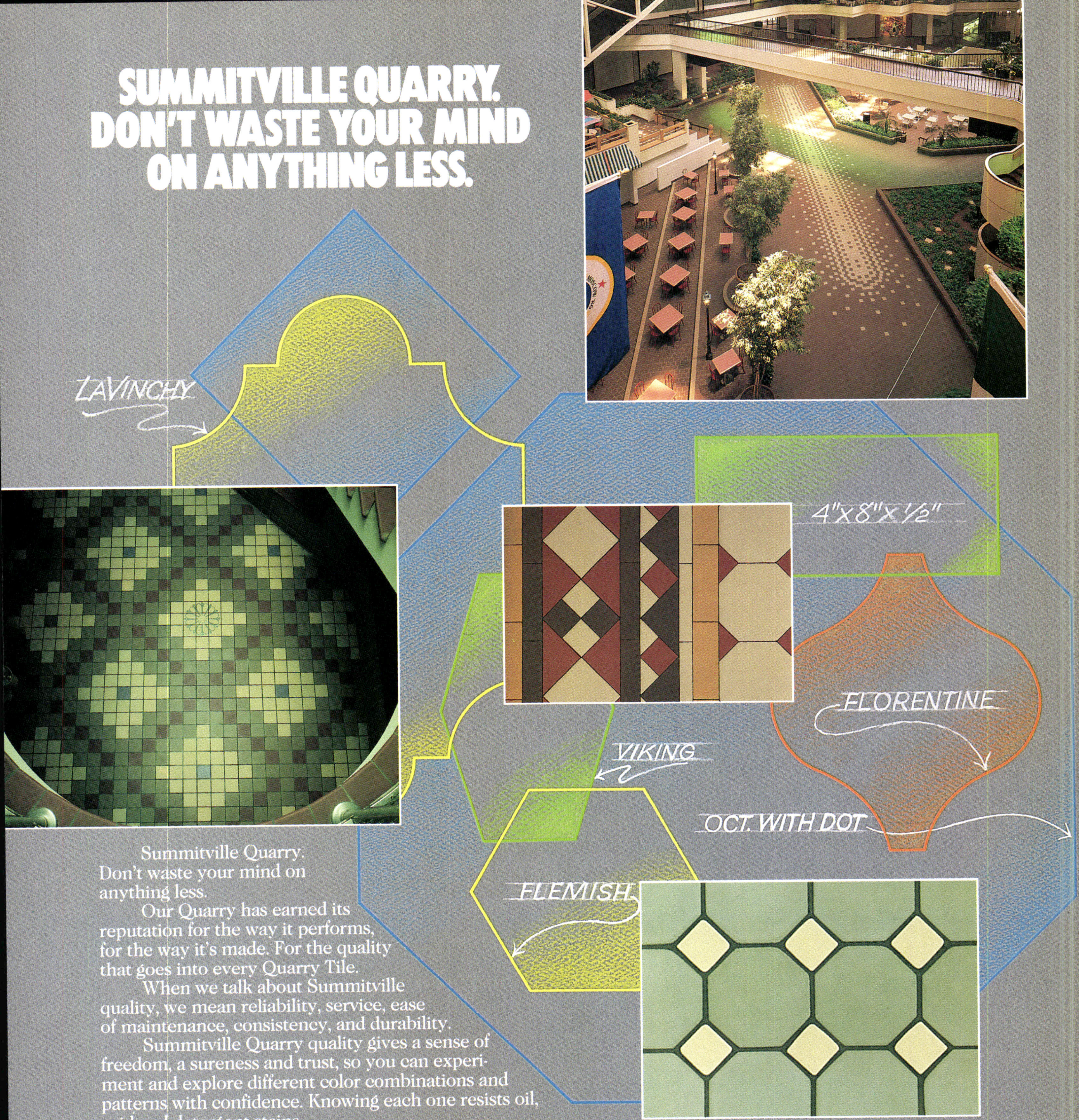

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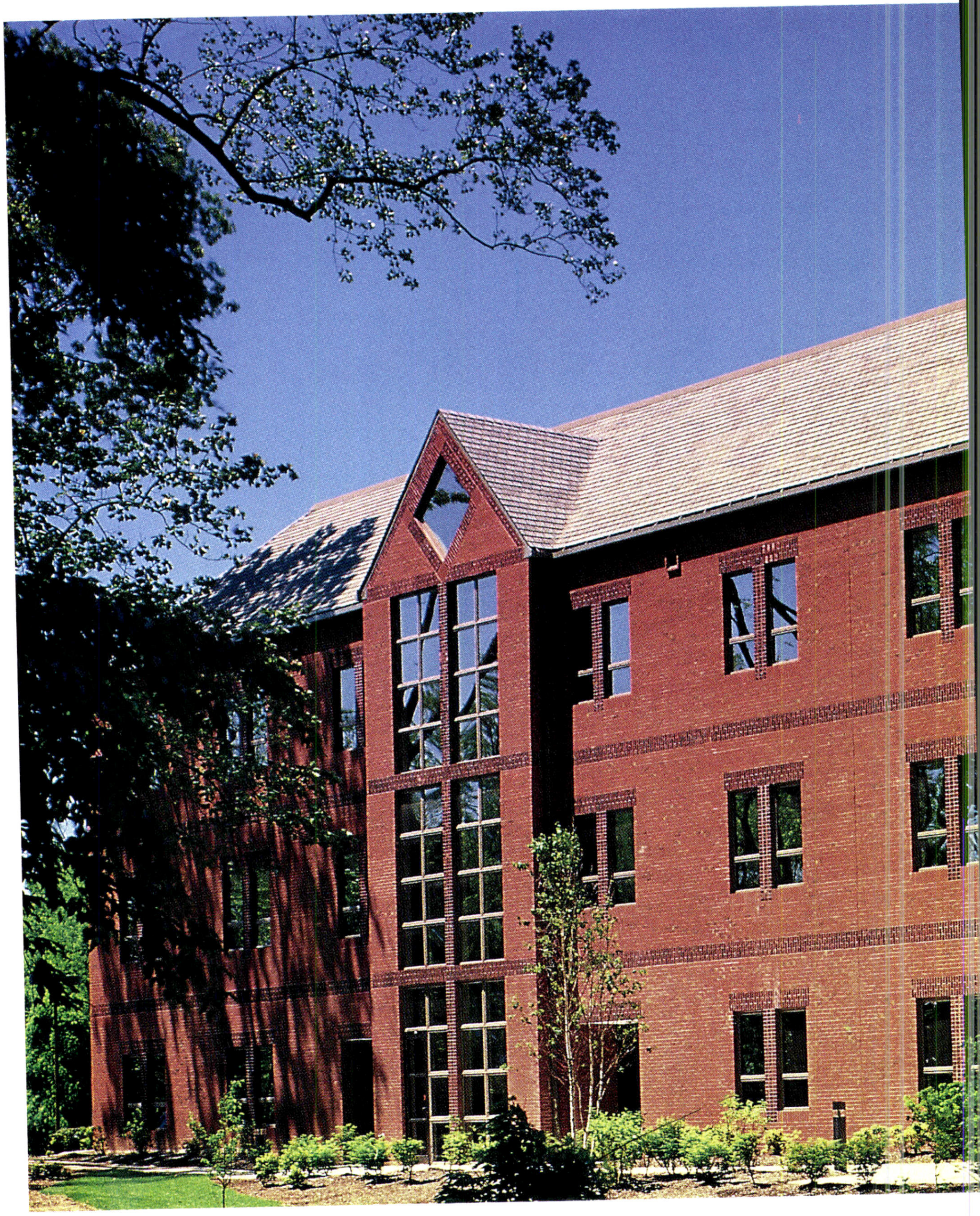

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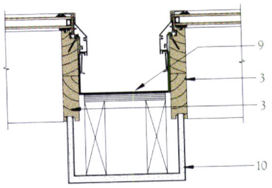

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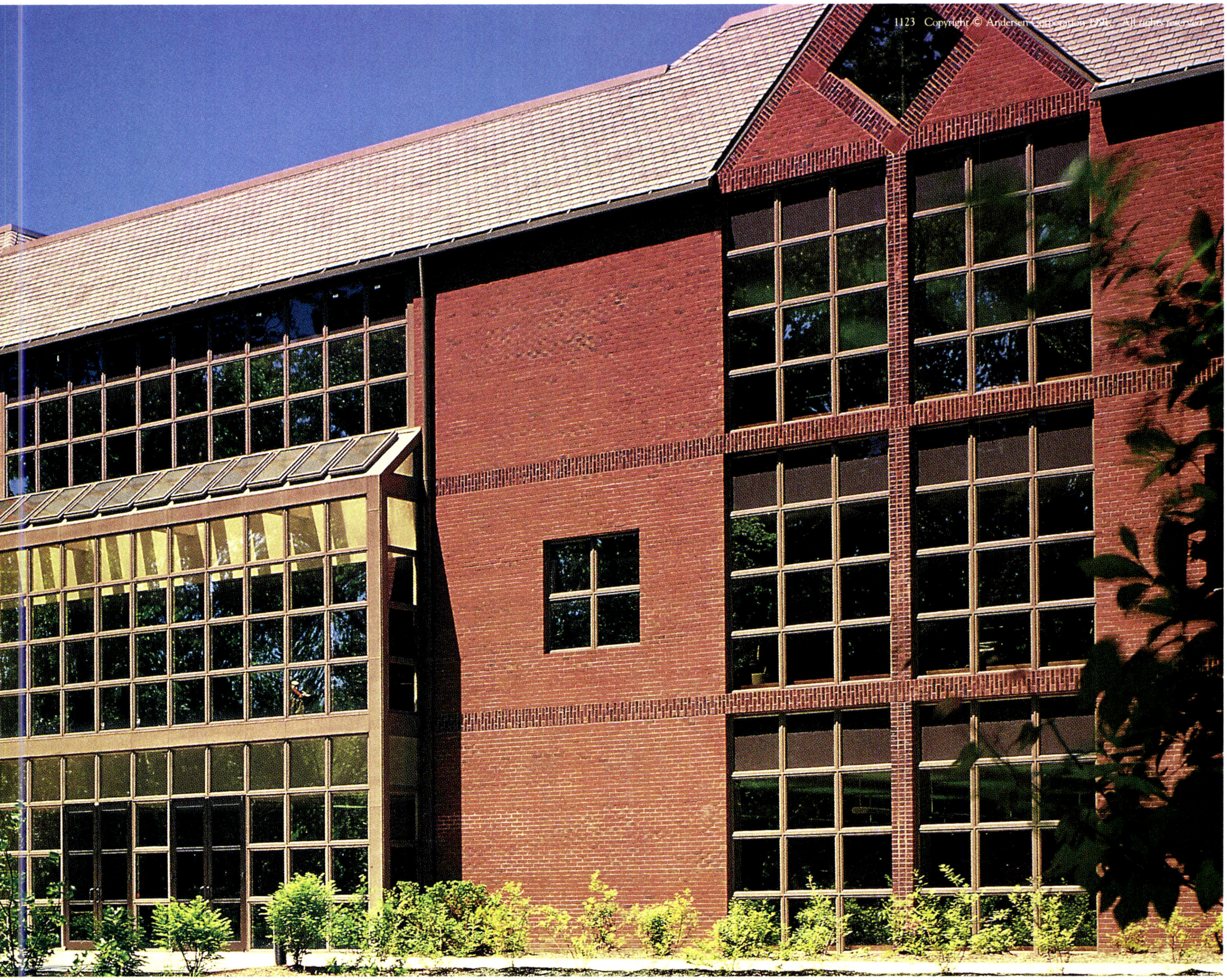

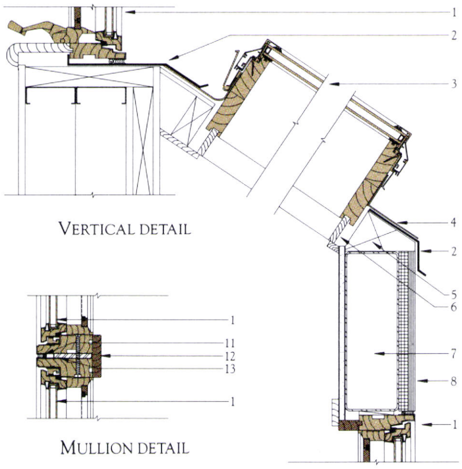
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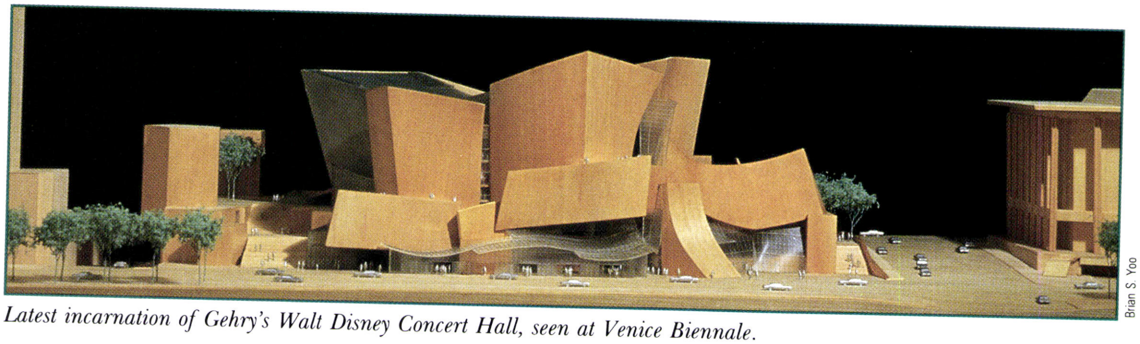

Latest incarnation of Gehry's Walt Disney Concert Hall, seen at Venice Biennale.

Brian S. Yoo


Stirling's Electa bookshop.

Monica Pidgeon


Interior of Electa bookshop.

Monica Pidgeon


Grimshaw's hypothetical airport design.

Jens Willebrand


Biennale sculpture by Massimo Scolari.

Monica Pidgeon

……

Global Diversity at Venice Biennale

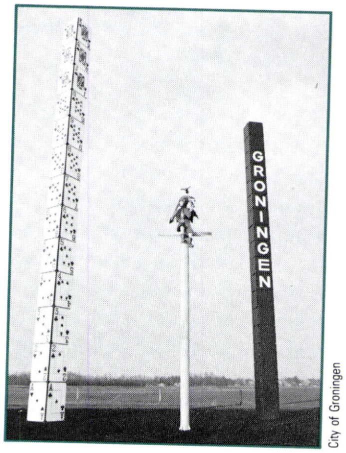
How appropriate that Venice – where architecture is the city's main attraction – should be the venue for the largest of all regular architectural shows, the Fifth Architectural Biennale, which took place in September under the direction of Francesco Dal Co. While this year's Biennale did not attempt to make as strong a statement as the first one, ("The Presence of the Past," which put Post-Modern kitsch on the map), it certainly displayed the astonishing diversity of world architecture today.

The event took place, as always, in the Giardini del Castello, a waterside park where 29 nations had their own pavilions and determined how to promote their countries' talents. The prize offered to the "best" went this year to Austria and its commissioner Hans Hollein for continuously ensuring the high standard of its presentations.

But a strong contender was the U.S. pavilion shared by Peter Eisenman and Frank Gehry. Philip Johnson, in his role as U.S. commissioner, had selected them as "architects who were challenging their discipline most aggressively and exploiting architectural risk most successfully." Gehry stole the show by depicting the genesis of his Walt Disney Concert Hall in Los Angeles (P/A, Feb. 1989, p. 21) with dozens of wooden models of all sizes made while teasing out the final form of the hall. It was a splendid way to demonstrate the difficulty of designing a building. Eisenman showed models and beautiful, though incomprehensible, wall-long computer drawings of his addition to the College of Design, Architecture, Art & Planning at the University of Cincinnati (P/A, Jan. 1991, p. 82).

At the huge Italian pavilion, interest focused on the more than 300 entries in the international competition for the Piazzale Roma area adjoining Venice's railway station. The winners, Britons Jeremy Dixon and Ed Jones, were announced at the opening ceremony, as was the result of the competition for a festival cinema on the Lido (P/A, Sep. 1991, p. 142), won by Rafael Moneo.

The British pavilion featured work by six of the country's most prominent architects: James Stirling, Norman Foster, Richard Rogers, Michael Hopkins, Nicholas Grimshaw, and John Outram. Grimshaw's large model of a hypothetical airport in the form of an oval doughnut was arresting, as



City of Groningen

In Perspectives (page 94): The city of Groningen, the Netherlands, cultivates the avant-garde. (Above: John Hejduk's project for "Marking the City Boundaries")

Pencil Points

The 1991 Andrea Palladio International Award (P/A, Dec. 1989, p. 26) has been won by Cristian Undurraga and Ana Luisa Deves of Chile. Their hillside house in a Santiago suburb was chosen for its "... profound sentiments of domesticity ... integrated with a remarkable sensitivity for nature."

The Guggenheim Museum has announced plans to open a branch designed by Frank O. Gehry & Associates in Bilboa, Spain. Gehry's design of a sand-blasted steel and concrete building for a riverside site has been accepted by the museum board; the museum is expected to open in 1995.

Morphosis has announced that principals Michael Rotondi and Thom Mayne will work separately. Mayne will continue his work at Morphosis, while Rotondi plans to open his own office in January with graphic designers April Greiman and Eric Martin and filmmaker Robert Greenberg.

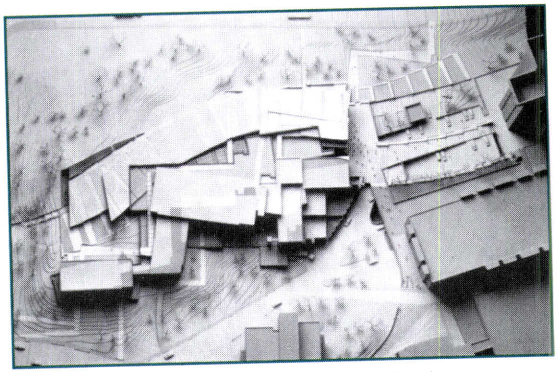
Thompson Ventulett Stainback & Associates and a team of Chicago-based developers, engineers, and contractors have won a design/build competition for a $675-million expansion of McCormick Place, a Chicago convention center. The two-million-square-foot building is expected to open in 1996.

The Santa Clarita, California, City Center design competition has been won by Urquieta-Zecchetto Associates, San Francisco and Santa Monica. The two-stage competition called for a series of civic buildings and a master plan. Construction of the $35-million city hall is expected to begin next year.

Financially-strapped architect/developer John Portman has been given a reprieve by his lenders through a five-year debt-restructuring agreement according to a report in *The Wall Street Journal.*

were Outram's huge paintings of his Blackfriars project. Stirling, in addition to showing drawings of his life's work, was much in evidence elsewhere at the Biennale. He was a juror for both international competitions, and with his partner, Michael Wilford, and Tom Muirhead, he designed a beautiful little bookshop for Electa in the Giardini.

The variety of the many nations' exhibitions was fascinating: Finland's purity of design, represented by Juhanni Pallasmaa; Hungary's recent organic style; Norway's and Sweden's dedication to Sverre Fehn's work; Denmark's many competition results for public buildings; Japan's as yet unjudged entries for the Kyoto City Concert Hall; Czechoslovakia's "Poetry of Sobriety"; Germany's concentration on the work of the late Heinrich Tessenow; Israel's inclusion of Zvi Hecker's spiral block of flats; Belgium's and Holland's endless unlabeled projects; Switzerland's few large photos of Herzog and de Meuron buildings; France's bewildering "Forty under Forty"; Brazil's exuberance. Spain understandably concentrated on Barcelona's preparations for the 1992 Olympics, while the USSR showed optimistic space-age models, notably credited to individuals.



Eisenman's Cincinnati project, shown at Venice.

To guide visitors to the overspill in the nearby Corderie dell'Arsenale (a kilometer-long disused rope factory), Massimo Scolari designed a huge timber sculpture by the canal as well as the actual entrance gate (which spawned small replicas elsewhere in town to mark related events). In the Corderie Dell'Arsenale, 43 international schools of architecture were allotted space. (SCI-ARC and Yale represented the U.S.) Some of their shows were very laid-back – just drawings on the wall – as in the case of New Zealand, which, strangely enough, was awarded the prize for best school. But others were more innovative or theatrical, even seeming to have nothing to do with architecture (including the AA's commended entry). Hans Hollein's School of Applied Art in Vienna staged a show called "Places and Piazzas" consisting of detailed models – made, remarkably, by first-year students – at the same scale, of magical spaces around the world from the Acropolis to Fatephur Sikkri. **Monica Pidgeon** ■

Ballpark with Civic Amenities for Arlington

The Texas Rangers baseball team has chosen David Schwarz Architectural Services of Washington, D.C., as design architect for the club's new ballpark in Arlington, Texas. Also named to the project were HNTB of Kansas City as sports architect, and HKS of Dallas as production architect.

Elevation of winning Rangers Stadium project.

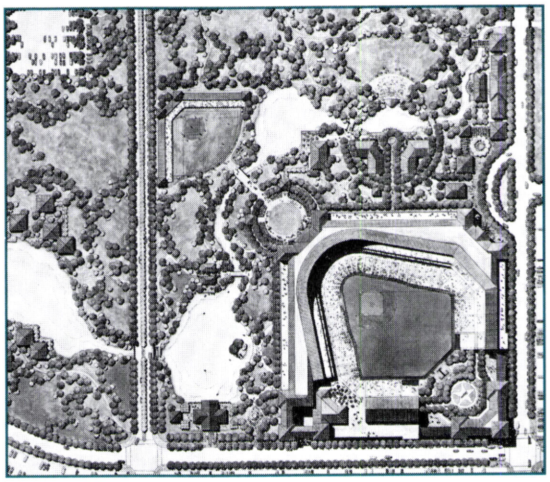
Schwarz and the other design team members were chosen following a competition, announced in May, in which 26 firms were invited to present proposals to the Rangers management, including owner George W. Bush (son of the U.S. President), and team president Tom Schiefer. Put together with help from architects in Fort Worth, the list of invitees went beyond the familiar names in sports design to include nationally known firms and a number of Texas-based firms known for their "regional" design approach. The program, prepared by Michael Pittas of Design Development Services of Los Angeles, called for a traditional, 46,000-to-52,000-seat ballpark; the designs were to link the facility with the nearby Six Flags Over Texas and Wet 'N' Wild amusement parks (major local economic forces) to create a new center for Arlington, including a replica of the ballpark for little league use, a riverwalk with shops and restaurants, a learning center, a sports hall of fame, and a 1500-seat amphitheater, all for a final cost of $165 million. This dizzying array of requirements grew out of the fact that $135 million for the project will come from sales-tax-backed bonds approved by Arlington voters in 1990, when the Rangers were considering moving the ballpark to downtown Dallas. City officials, fearful of losing the team, included the extra items to make the bond package more attractive to voters.

In addition to Schwarz, 15 firms made presentations to the board, including such well-known ones as Antoine Predock Architect of Albuquerque, Michael Graves of Princeton, New Jersey, Hammond Beeby & Babka of Chicago, and Hardy Holzman Pfeiffer Associates of Los Angeles.

Some of the schemes presented by these teams focused on making urban spaces out of the non-baseball spaces in the program. Lake/Flato Architects of San Antonio, for example, created a densely layered, landscaped park environmentally tuned to cool the stadium, while Keating Mann Jernigen Rottet of Los Angeles focused on elabo-

rating the parking lot to make it the center of Arlington's "drive-through Yellow Pages" freeway strip. Others played more whimsically with forms and images: Charles Moore/Arthur Andersson of Austin, for example, surrounded the ballpark with a five-pointed star of structures.

Schwarz's winning design sites the shopping center, learning center, hall of fame, and other functions around a central lake that loops around the infield. Parking is distributed in islands, and much of the site is planted with trees. The exterior of the ballpark itself will have brick arches set over a rusticated granite base, longhorn-head decorations, and baseball-shaped lighting fixtures. In one particularly pleasant touch, the center field will feature raked lawn seating instead of individual seats or bleachers. **Joel Warren Barna** ■


Site plan for stadium and environs.

. . . .

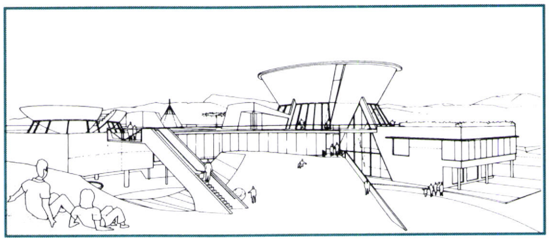
Santos Scheme for Perris, California

An environmentally attuned design by Adèle Naudé Santos has won the competition for a civic center in the city of Perris, California, besting proposals from teams that included Venturi Scott Brown & Associates; Robert Mangurian; and William Turnbull.

The program calls for a mayor's office, a city council chamber, a police station, and various administrative offices in 245,000 square feet. For Perris, a small town 60 miles southeast of Los Angeles with minimal urban context, Santos chose to dramatize the natural phenomena of a desert landscape where wind and sky are the most notable elements. In collaboration with San Diego landscape architects Wallace Roberts & Todd and artist Mathieu Gregoire, Santos arranged the building around courtyards that function as viewing platforms for the ever-changing behavior of sky, wind, rain, and vegetation.

A "sky catcher" courtyard next to the mayor's office and council chambers features a four-story inverted cone open to the sky. The inner surface of the cone is a mirrored surface on which observers "can see the reflection of the sky, as well as skydivers and balloons and things that are always floating by," says Santos. The "earth chamber," surrounded by administrative offices, is another cone, this time right side up, which serves as a terrarium of native soil and rocks, again mirrored on interior walls. The police building is surmounted by a "wind catcher," with a parabolic roofline that in section resembles a pair of wings; the "outside" section of the wings scoops prevailing breezes into the building, while the "inside" area funnels rainwater to an interior cistern.

Rather than attempt to integrate the new civic center with what Santos describes as the "undistinguished" buildings on the site, the team opted instead to separate the new and the old with an earthen mound; a scooped-out portion of the mound serves as an informal gathering place for the council meetings, while the top of the mound offers grassy seating for outdoor movie screenings.


Perspective of Santos scheme for Perris.

Other teams competing were Studio Works/Robert Mangurian and Mary Ann Ray, architects, with Burton & Spitz, landscape architects, and Eric Orr, artist; William Turnbull Associates, architects, with Andrew Spurlock Marian Poirier, landscape architects; and Anderson/Schwartz in joint venture with Venturi Scott Brown & Associates, architects, with Quennell Rothschild Associates, landscape architects. Jurors were architect Frederick Fisher, artist Mary Louise Donovan, landscape architect Martha Schwartz, industrial designer Benjamin Stansbury, and Perris citizen Marion Ashley. **Morris Newman** ■

. . . .

Train Station Revived as Museum Center

Cincinnati's Union Terminal is again drawing crowds as it did in its heyday, when it was one of this country's busiest railroad stations. But today's attractions are dinosaurs, a sidewheel steamboat, and a prehistoric ice cavern. Union Terminal is now Cincinnati's new Museum Center, housing the Cincinnati Museum of Natural History, the Cincinnati Historical Museum and Library, a children's discovery center, and an Omnimax theater.

The conversion of the 58-year-old train station (originally designed by Alfred Fellheimer and Steward Wagner, with design consultant Paul Cret) came after two decades of uncertainty. Closed in 1972 when the last passenger train left, Union Terminal stood empty until the early 1980s,

(continued on next page)

Obituaries

William Crabtree

British architect William Crabtree died on March 11. He was 86. Working during the heyday of English Modernism, Crabtree is perhaps best known for his design of the Peter Jones department store (1939) on Sloane Square in London. The curved façade of this low-rise building is carefully articulated with what was then a new technology: the curtain wall.

Morton H. Delson

Morton H. Delson, a Taliesin graduate and former East Coast representative for Taliesin Associates Architects, died July 28. He was 61. The Guggenheim Museum and Annex and the Mercedes-Benz showroom were among the Wright projects in which he was involved. Delson also had his own practice in New York.

Michael Kalil

Designer Michael Kalil died July 2 at age 47. Kalil's interior design projects (P/A, Sep. 1990, p. 104) demonstrated an enduring curiosity about human experience within the built environment. The tools of his design vision were lighting and materials, together creating unencumbered spaces where inhabitants could benefit from the natural as well as the man-made. Kalil established his own firm in 1971, and worked with the late Giuseppe Zambonini at the Open Atelier of Architecture in New York in the early 1970s. In 1983 NASA hired Kalil to develop conceptual designs for inhabitable space modules. He taught and lectured at Parsons School of Design, New York School of Interor Design, Columbia University, and the University of North Carolina.

Russell Lynes

Cultural commentator and editor Russell Lynes died at age 80 on September 14. As managing editor of Harpers (1947–1967) and writer of books on habits and habitats, Lynes devoted his writing to evaluating what was in good taste and what wasn't; he developed a unique perspective from which he based

(continued on next page)

Obituaries

(continued from previous page)

criticism on social manners and mores rather than on class. Many of his articles and essays targeted architecture and design. His book *Highbrow, Lowbrow, Middlebrow* (1949) made popular the words in its title; *Snobs* (1950), *Guests* (1951), and *The Tastemakers* (1954) were among his other influential publications.

Stanley Salzman

Architect and educator Stanley Salzman, FAIA, died July 15 at age 67. The early part of his career was spent working for Walter Gropius, Marcel Breuer, and Skidmore Owings & Merrill in New York. He was a partner in Salzman & Breger and Edelman & Salzman, and opened his own firm in 1979. Salzman taught at the Pratt Institute for 46 years. He was a fellow and former chairman of the National Institute of Architectural Education, and a fellow of the American Institute of Collegiate Schools of Architecture.

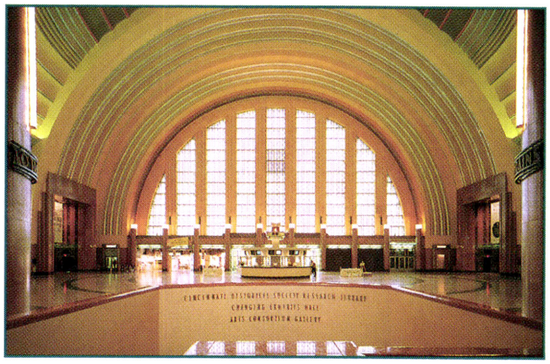
Lisa Taylor

Lisa Taylor, former director of the Cooper-Hewitt Museum in New York (1969 to 1987), died on April 26. She was 58. Appointed to the position three years before the museum moved to its present location in the Andrew Carnegie mansion (from Cooper Union, where it was established in 1897), Taylor was a major force in raising funds to install the collection there. Her efforts helped to shape the museum's role as an institution dedicated to raising design awareness; she also initiated the annual Museum Mile open house and street fair, now in its tenth year.

Train Station

(continued from previous page)

when it became a short-lived shopping mall (P/A, Nov. 1980, p. 100)). When the latter failed, city officials were again confronted with the dilemma of what to do with the landmark terminal. Enter Boston architect E. Verner Johnson, who proposed that it be turned into a super-museum. "From the beginning, I saw a lot of potential in Union Terminal," Johnson says. "I was especially interested in the amount of space, including the unfinished area below the rotunda area, of which few people in Cincinnati were aware." Following heated debate and passage of a temporary sales tax levy, the $68-million renovation began in 1987, with Glaser Associates of Cincinnati as architect and Johnson's firm, E. Verner Johnson & Associates, as design architect.



Robert Ames Cook

Rotunda of Cincinnati's restored Union Terminal.

The station's transformation centered around two separate projects: restoration of the vast half-domed rotunda, which Johnson viewed as the heart of the museum, not to be used for exhibitions, and development of the old taxi ramps and underground parking lots for exhibits.

The rotunda, large enough to encompass a ten-story building and supported by eight arched trusses, was meticulously refurbished, and its dome painted in its original colors of bright yellows, golds, and oranges. Particular care was lavished on the terminal's Art Deco fixtures, and the 100-foot-long Weinhold Reiss mosaics depicting the history of the city and American industry. The terminal's information kiosk was recreated for use as a ticket booth. Major renovations were made in the underground space beneath the rotunda, which Johnson refurbished as "black box" exhibition space.

The new museum center has already proved to be a success, exceeding projected attendance figures. And in an ironic twist worth noting, Amtrak recently returned its Chicago-to-New York Cardinal Express to the terminal, again enabling the station to fulfill its original function. **Peter Wilson** ■

The author is a freelance business writer in Cincinnati, and author of the book A Question of Interest: The Paralysis of Saudi Banking.

Pennsylvania Ruling Raises Preservation Questions

On July 10, the Pennsylvania Supreme Court handed down a ruling in the case of United Artists Theater Circuit, Inc. v. City of Philadelphia that has had local and national advocates of historic preservation reeling. In that decision, the majority of the Court held that designating a property as historic without the consent of its owner constituted an uncompensated 'taking' of property and thus violated the state constitution. Preservation advocates are concerned that the Pennsylvania ruling, while not legally binding in any other state, could establish a powerful precedent and influence pending legislation throughout the country.

"The ruling is a reversal of conventional wisdom in the preservation area and is at odds with rulings of the U.S. Supreme Court and courts in dozens of other states," says attorney Frank Thomas of the Philadelphia firm of Morgan Lewis & Bockius, who has entered the case on behalf of the National Trust for Historic Preservation. "If allowed to stand, it will have a crippling effect on preservation in the Commonwealth of Pennsylvania and a chilling effect elsewhere."

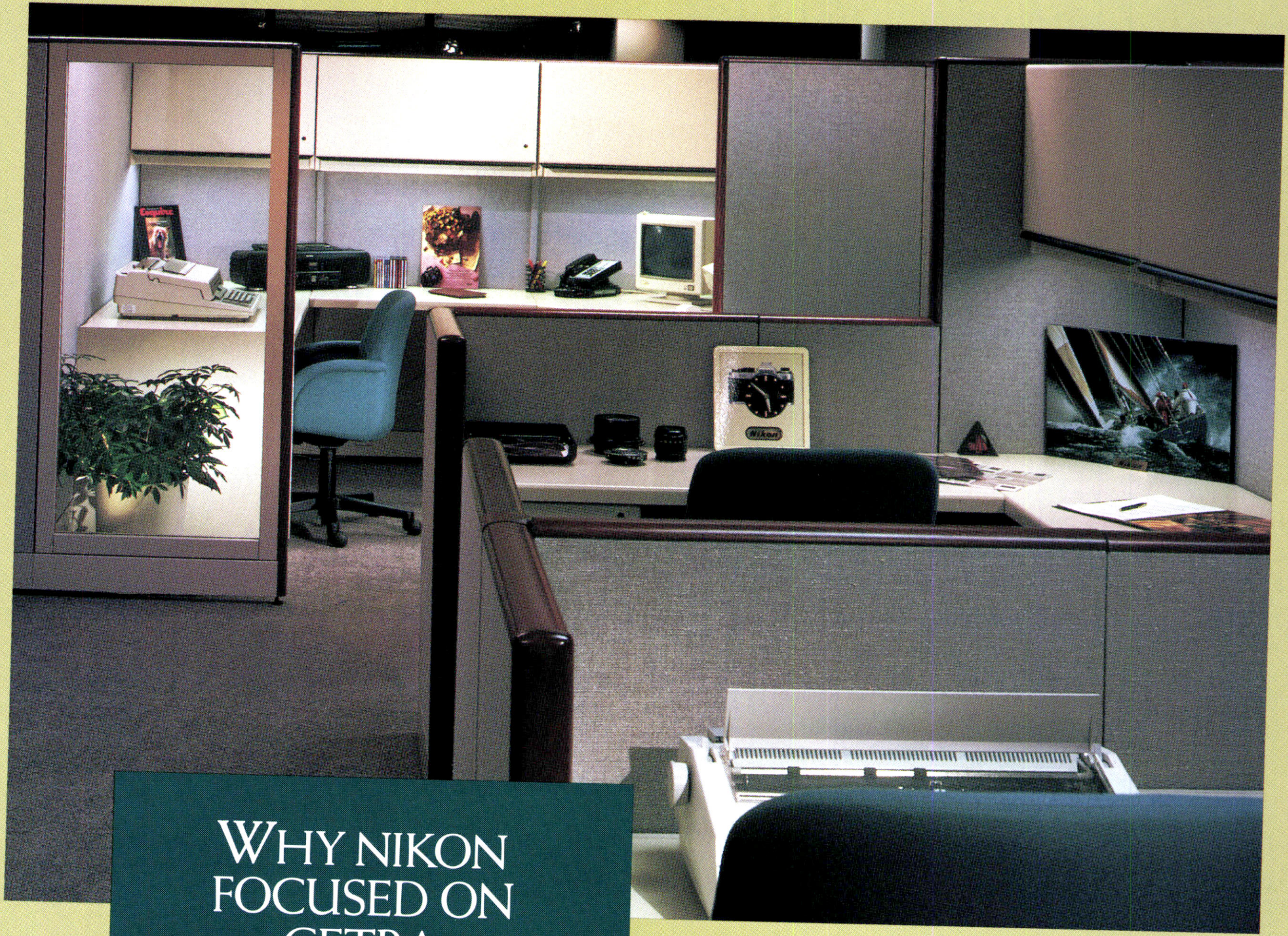
J. Shane Creamer of the Philadelphia firm of Sprague, Creamer & Sprague, who represented the plaintiff, disagrees: "The whole preservation situation may be revisited. . . but I do not necessarily think it will have a far-reaching impact. It will only affect those few cases when the owner objects to an historic designation, and then only when there is no appropriate compensation. In effect, our opponents are crying 'wolf' when there is no wolf."

The Pennsylvania case centers on the Boyd Theater, located at 19th and Chestnut Streets in Central Philadelphia. Built in 1928, the theater is remarkable for its Art Deco interior, featuring grand lobbies and a decorated proscenium. The Sameric Corporation (who later sold the theater to United Artists) sought to demolish the building, but was prevented by a 1987 landmark designation. They took the issue to the Pennsylvania Supreme Court in 1989, ultimately prevailing in the July 10 ruling.

This summer, the City of Philadelphia filed a petition with the state Supreme Court calling for a rehearing of the case, with attorney Thomas filing an amicus brief on behalf of the National Trust, which was joined by the American Institute of Architects and ten other local and national organizations. In September, the state Supreme Court granted the motion, an unusual event that has given preservation forces room for optimism. The rehearing was scheduled for late October, and a decision is likely by the end of the year.

In the meantime, preservation efforts in Pennsylvania are at a standstill. "The ruling has put a hold on all landmark and historic district designations," says Richard Tyler, preservation officer for the City of Philadelphia. "Until the court's ruling is clarified, there is little we can do."

Donald Prowler ■



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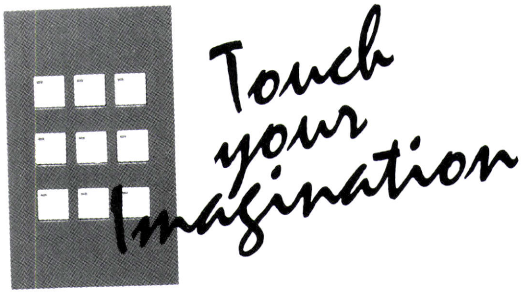

Calendar

Exhibitions

Gaetano Pesce Through November 30	**New York.** Pesce's seemingly amorphous furniture design clamors for attention and demands discussion. His use of colored urethane, felt, and other nontraditional materials offers a compelling alternative to conventional design. This mid-career survey is being held in conjunction with an exhibit of Pesce's architectural works at the Tel Aviv Museum of Art. Peter Joseph Gallery.
VSBA's Sainsbury Wing Through December 4	**New York.** Venturi Scott Brown & Associates' recently completed Sainsbury Wing of the National Gallery in London is documented from Venturi's sketch on a restaurant napkin through study models and finished plans to photographs of the building on Trafalgar Square. Architectural League of New York, Urban Center Galleries.
Architecture in Perspective Through December 6	**New York.** Winning entries in the American Society of Architectural Perspectivists' sixth annual competition, including Luis Blanc's "Affordable Housing, Now," this year's Hugh Ferriss Memorial Prize winner (P/A, Aug. 1991, p. 24), will be on view. Urban Center Galleries.
Meyer, Scherer & Rockcastle November 10–December 14	**St. Cloud, Minnesota.** This "interpretive retrospective" is being held in honor of the firm's ten-year anniversary. Their design for the Herman Miller Design Yard was a winner in the P/A Awards (P/A, Feb. 1990, p. 98). St. John's University.
Yemeni Architecture November 14–December 13	**Muncie, Indiana.** Photographs by Peggy Crawford document six regional styles in "Yemen: A Culture of Builders," a traveling show sponsored by the American Architectural Foundation. College of Architecture & Planning, Ball State University.
In the Spirit of Modernism November 14– February 2, 1992	**San Francisco.** First in a series of exhibitions on Bay Area architects, this show will feature the work of four firms: Jim Jennings, William Stout, James Shay, and Tanner Leddy Maytum Stacy (a house designed by Jennings and Stout appears on page 78). In addition to their projects, built work, and furniture, each firm has been asked to produce a design that "addresses a specific challenge in contemporary urban design." Museum of Modern Art.
Arthur Edwin Bye November 27–March 1, 1992	**New York.** Works by the American landscape architect, whose "designs are characterized by strong ecological and regional contextualism and a subtlety of human influence upon the land," will be on view. Wave Hill.
Morphosis December 4–28	**Kent, Ohio.** Work by the California firm of cerebral mavericks will be on display. Michael Rotondi and Thom Mayne, principals of Morphosis, split up this summer; Mayne remains head of Morphosis and Rotondi is starting his own firm called "Rotondi." A house designed by both appears on page 54. Taylor Hall, Kent State University.

Competitions

The Most Beautiful House Application deadline December 15	**Reggio Emilia, Italy.** The second edition of "The Most Beautiful House in the World" design competition has been announced. Initiated in hopes of "rediscovering a language with which once again to talk about beauty [in architecture]," the winning design will be built in the sponsor's hometown. Contact Societa "Arcantorie," Via Passo Buole 96, 42100 Reggio Emilia, Italy (0522) 21100 or FAX 321319.

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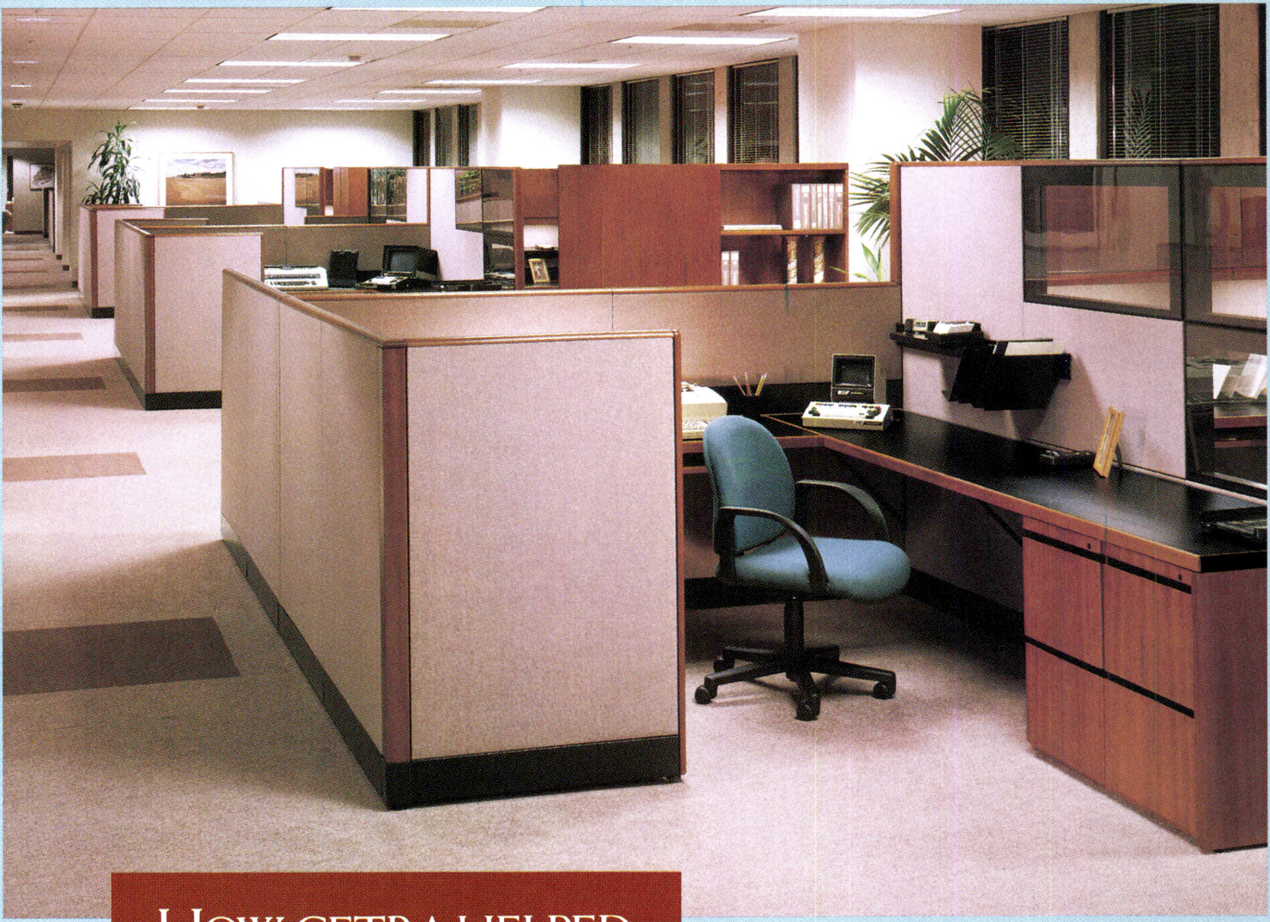

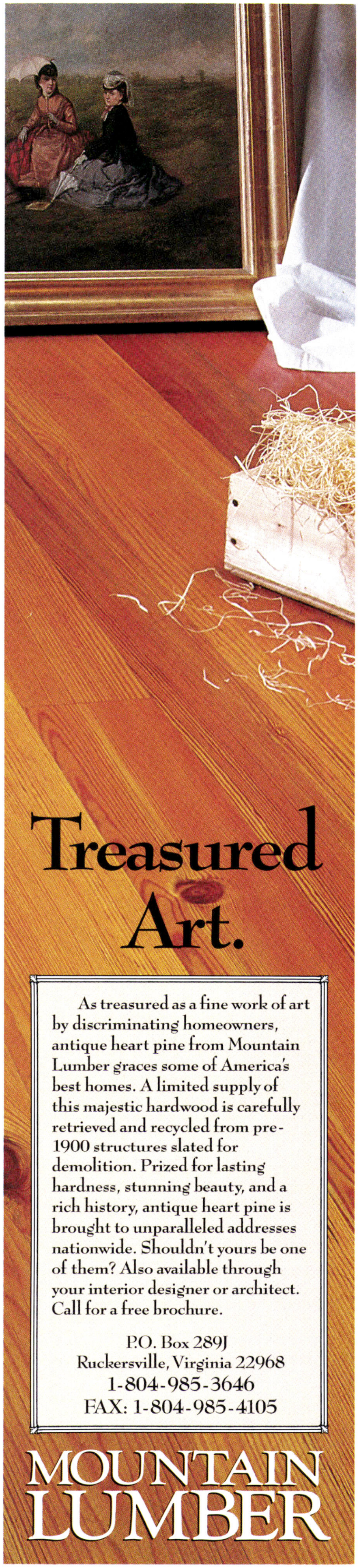

Calendar *(continued from page 30)*

Buell Doctoral Fellowship Application deadline December 31, 1991	**New York.** The Buell Center for the Study of American Architecture at Columbia University has announced a new fellowship program. The two-year Buell Doctoral Fellowship is open to individuals at any department or school that offers the Ph.D. or equivalent. One fellowship will be awarded annually. Contact Buell Center, Buell Hall, Columbia University, New York, NY 10027 (212) 854-8165 or FAX (212) 854-2127.
Pritzker Prize Nomination deadline January 1, 1992	**Los Angeles.** Nomination deadline for the annual Pritzker Prize has been announced. Contact Pritzker Media Office, Keith H. Walker, 8802 Ashcroft Ave., Los Angeles, CA 90048-2402 (213) 278-7372 or FAX (213) 273-6134.
Rotch Travelling Scholarship Application request deadline January 2, 1992	**Boston.** Applicants for the two-stage design competition scholarship must be U.S. citizens under 35 years of age on March 22, 1992, and must have graduated from an accredited Massachusetts school of architecture and/or worked in a Massachusetts architectural firm. Contact Rotch Travelling Scholarship, c/o Boston Society of Architects, 52 Broad St., Boston, MA 02109.
Yokohama Urban Design Entry deadline January 26, 1992	**Tokyo.** "Harmonizing the City Center and the Port" is the theme of the third Yokohama Urban Design International Competition, sponsored by the City of Yokohama and the Yokohama Urban Design Forum. Entrants are asked to concentrate their efforts on the city's historic port, the Zo No Hana district, and an overall urban plan for the area. Overseas applicants are not required to register (Japanese participants must register by January 13, 1992), but are urged to request reference materials from the sponsor. Contact Department of the 3rd Yokohama Urban Design International Competition, Voice of Design Inc., Horizon - 1 Bldg. 3-30-16 Nishi Waseda, Shinjuku, Tokyo, Japan 81-3-5273-0149 or FAX 81-3-5273-0374.

Conferences

Architectural Boundaries November 16–17	**San Diego.** "Converging Lines: Architecture Beyond Boundaries" will explore the allied disciplines and their relationship to architecture; craft, technology, theater and film, landscape, and art are the chosen subject matter. Contact University of California at San Diego, School of Architecture, 9500 Gilman Dr., La Jolla, CA 92093-0938 (619) 534-5305.
Canadian Building Show December 4–6	**Toronto.** Billed as Canada's largest construction industry trade show, Construct Canada '91 will include over 600 product and services exhibitors; A/E/C Systems Canada will have space at the show. The Metro Toronto Convention Center is the venue. Contact York Expositions, 44 Wellington St., E., Suite 200, Toronto, Ontario M5E 1C8 (416) 869-1156 or FAX (416) 869-1660.
AIA Committee on The Environment December 6–7	**Atlanta.** The AIA's Committee on The Environment symposium will focus on national energy issues and energy-efficient design. Contact Kristine Dombrowski, AIA, 1735 New York Ave., NW, Washington, DC 20006 (202) 626-7452. ■

Notice	We strongly encourage readers to contact exhibition venues and competition and conference sponsors to confirm dates and/or request competition briefs, etc. In order to provide timely Calendar information, listings information should be submitted one and one-half months prior to publication (November 15 for the January 1992 issue, for example). For possible inclusion, please send relevant information to Abby Bussel, P/A, 600 Summer St., Stamford, CT 06904 or FAX (203) 348-4023.

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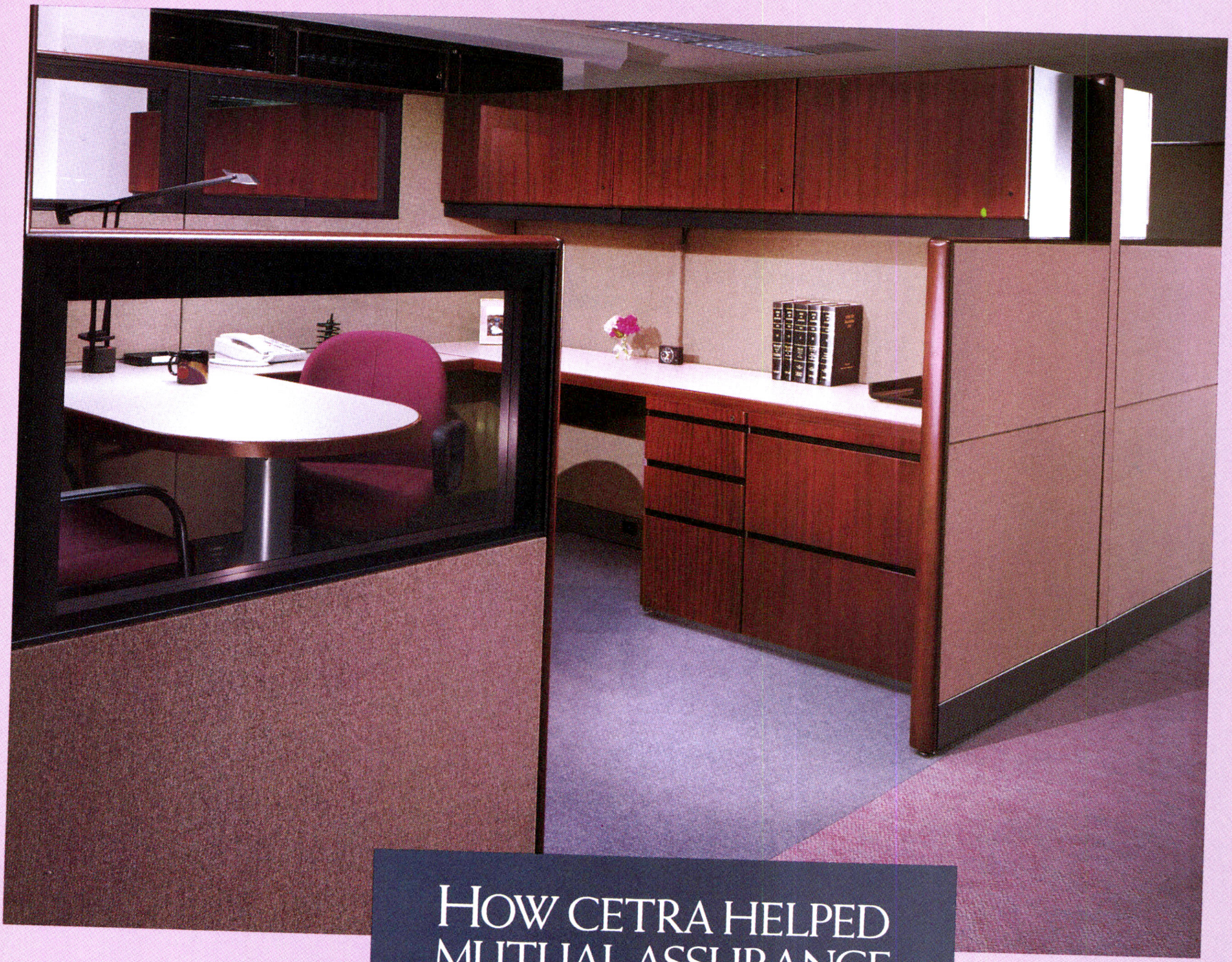

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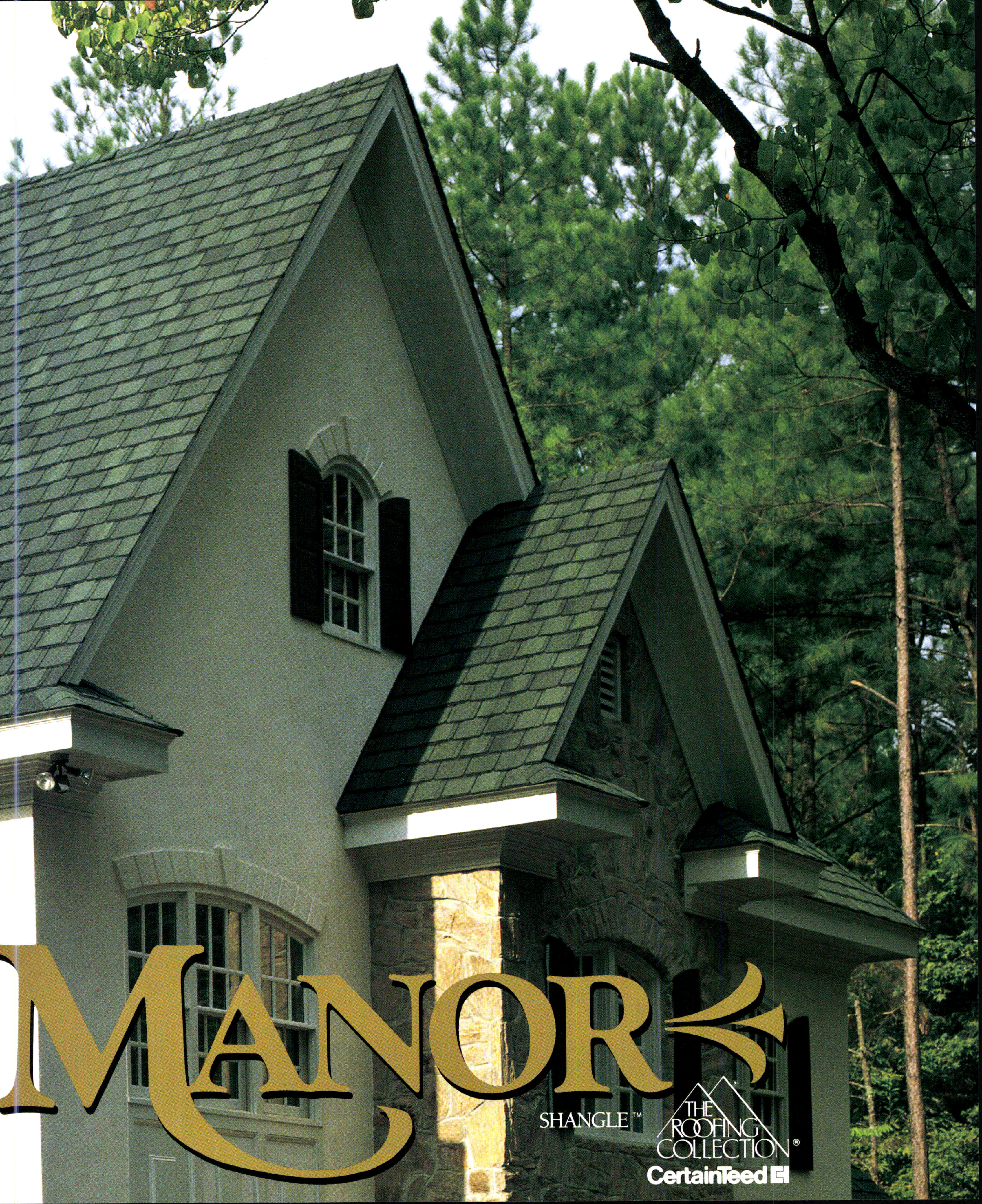

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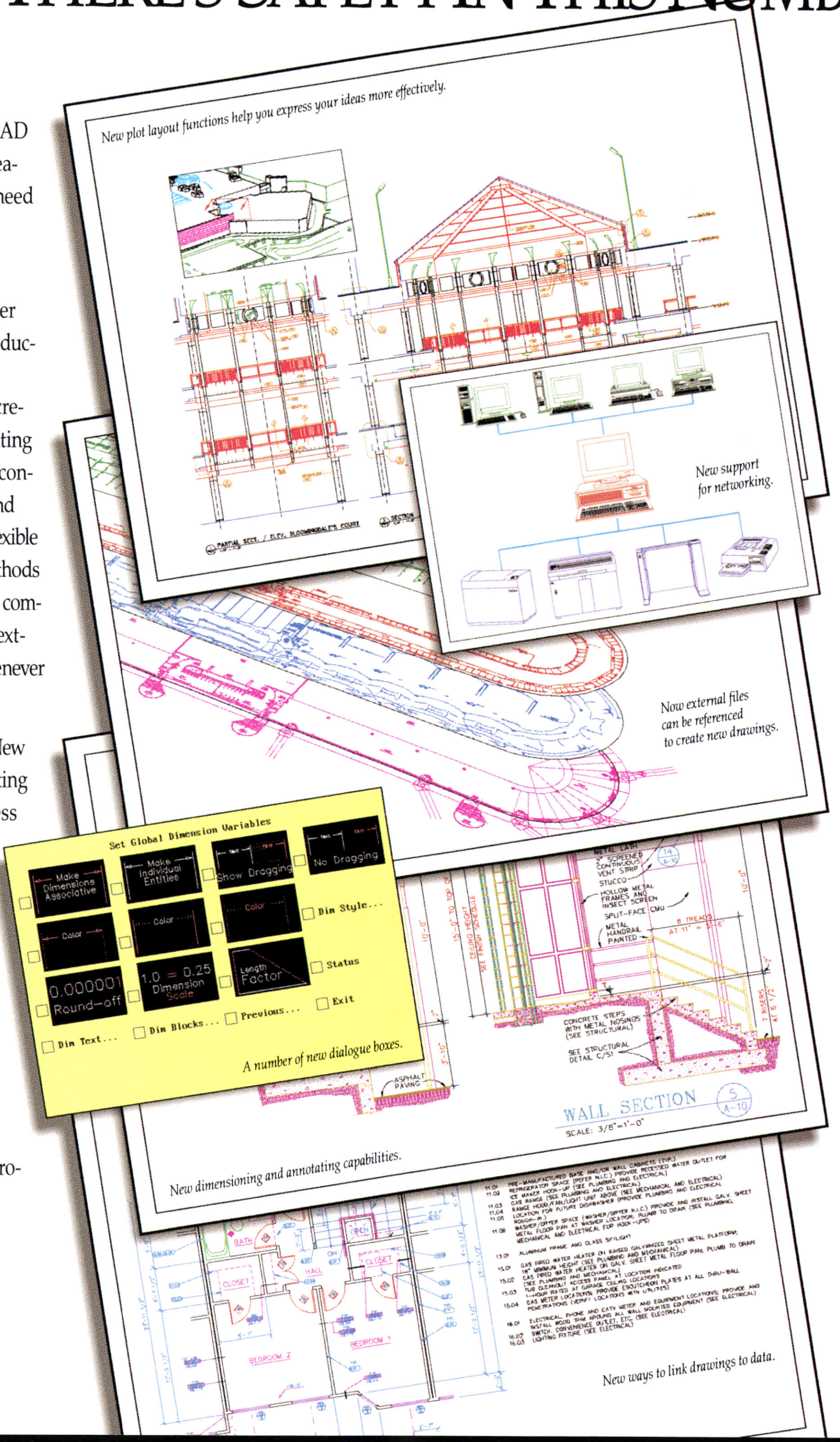

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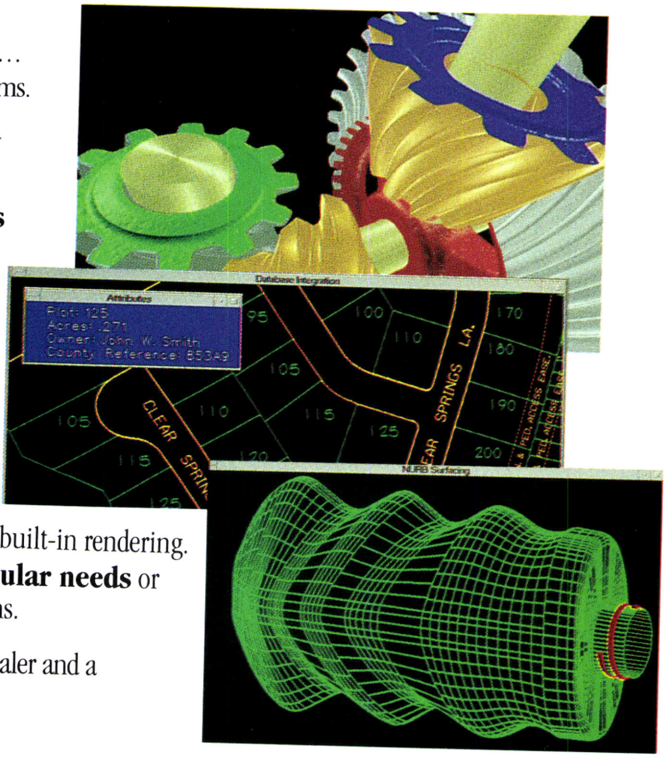

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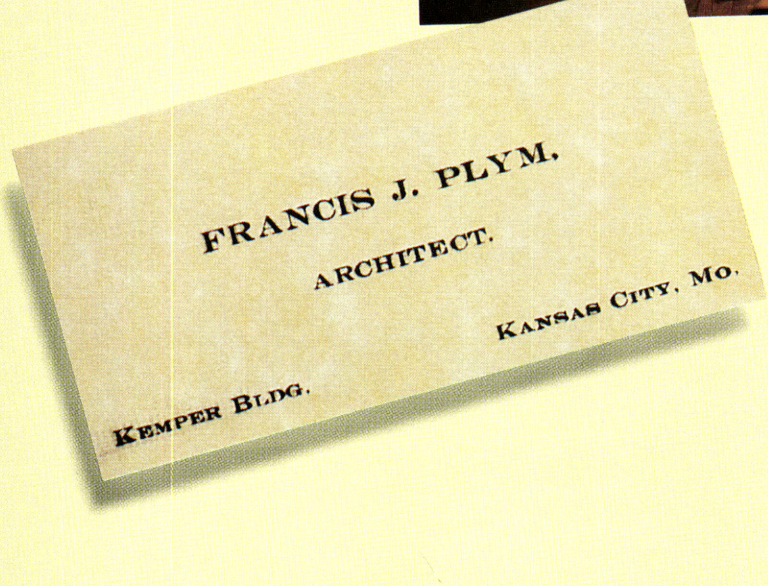

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Practice

Practice

Norman Coplan discusses a case in which the architect's ability to judge a contractor's work was questioned.

Law: The Finality of an Architect's Decision

Many construction contracts provide that the architect must conclusively determine the acceptability of the contractor's work. Such contracts, however, will generally not be enforced if the adequacy of the architect's own performance is also at issue. If the owner contends that there was fault on the part of both the contractor and the architect, the courts generally conclude that the architect cannot make an honest assessment of the contractor's performance and that the architect's determination should therefore not be accepted as final and conclusive. In summary, if the architect's performance is questioned, he or she will not be absolved by conclusively finding that the contractor was responsible for a defect in the construction of a building.

Does it follow, however, that an owner can challenge the finality of an architect's decision favorable to the contractor when the performance of both are claimed to be faulty? This unusual issue was presented to the Court of Appeals of North Carolina in the case of Ruffin Woody and Associates, Inc. v. Person County.

In this case, a contractor had entered into an agreement with a County to build an addition to the County Courthouse. The parties executed the standard form of contract of the American Institute of Architects, including its General Conditions, which makes provision for the arbitration of all claims arising out of the contract. Incorporated in the construction contract, however, were general conditions issued by the United States Department of Commerce, Economic Development Administration (EDA), which states that the architect's decisions related to the work were to be final and conclusive.

The contractor completed the project and the architect issued a certificate of substantial completion and a final report stating "that the contractor's work was acceptable". However, there were apparently defects in the structure and the County asserted claims against both contractor and architect, demanding a consolidated arbitration. The contractor opposed such arbitration on the ground that the architect had determined that his work was acceptable and that such decision was final and binding. The Court refused to prohibit the arbitration and ultimately the arbitrators entered an award against the contractor in the amount of $63,000 and against the architect in the amount of $32,000. The contractor appealed the confirmation of the award.

The Appellate Court concluded that the EDA General Conditions took precedence over the AIA document because they stated that "any provision in any of the contract documents which may be in conflict or inconsistent with any of the paragraphs in these General Conditions shall be void to the extent of such conflict or inconsistency".

The Appellate Court then had to determine whether the architect's exoneration of the contractor from any fault would be denied and be subject to arbitration because his determination might not reflect "an honest judgment". The Court pointed out that although the County had not alleged fraud on the part of the architect, it had alleged that the architect's designs were faulty and that the architect had breached his contract by not preparing change orders, not properly inspecting or testing the work and not rejecting work that did not conform to the contract documents, and not making periodic visits to the site to monitor construction. The Court stated that in its view, such allegations at least raised a question as to whether the architect failed to exercise his honest judgment in reaching his decision.

The County asserted that it could not obtain complete and fair relief unless there was an arbitration involving all three parties to resolve the question of responsibility for certain defects in the building and whether such defects were the result of design or construction. The Court ruled that the dispute came within the scope of the general arbitration clause and that the claim against the contractor could not be excluded because of the determination of the architect.

The Court's decision in this case, however, is questionable, since the architect's determination in favor of the contractor was adverse to the architect's interest. The architect, in exculpating the contractor, was increasing the risk that the defects and deficiencies in the work would be charged to him. Consequently, it is difficult to understand the conclusion of the Court that the architect's decision might not have reflected the exercise of an honest judgment and therefore could not be considered as final and conclusive.

Norman Coplan ■

The author is a partner in the New York firm of Bernstein, Weiss, Coplan, Weinstein & Lake.

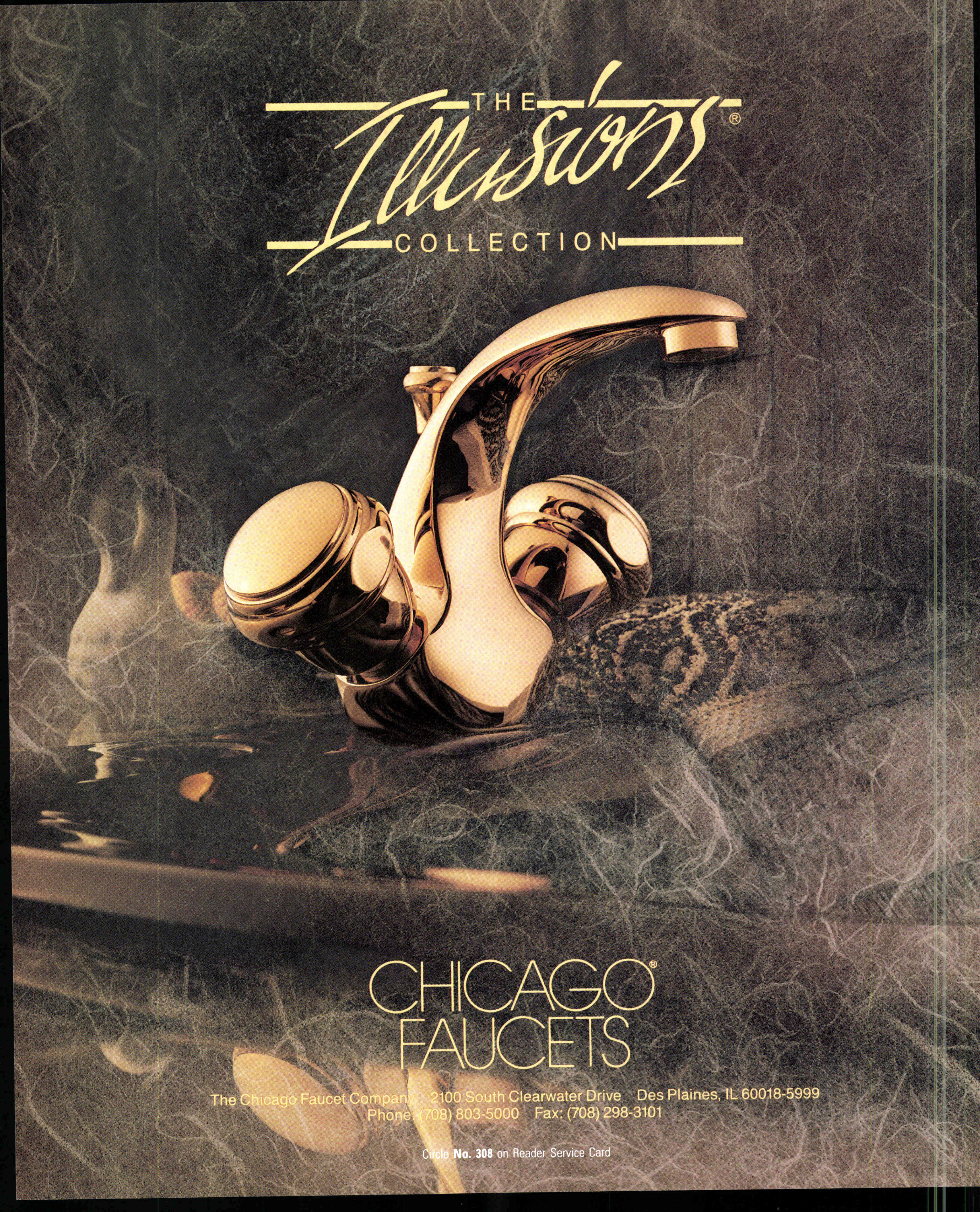
Practice Points

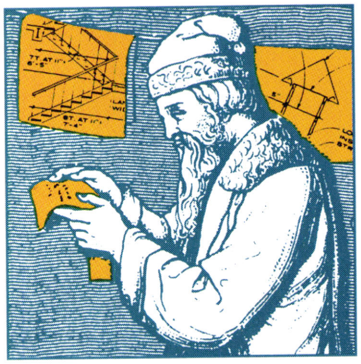
Since 1989 the architectural work force has been reduced by five percent, but salaries for associates and principals have increased by an average of more than eight percent, according to the *1991 AIA Salary Survey*. Call the AIA at (202) 626-7475.

How can an architect improve relations with contractors and owners on the job site? Thirty-four recommendations are offered in *Joint Recommendations, A Handbook for Architects, Contractors, and Owners*, published by the Associated General Contractors of California and the California Council of the AIA. Contact the CCAIA at (916) 448-9082.

Design principals would like to spend less time on firm and project management, according to the *1991 Principal's Survey of A/E/P & Environmental Science Firms*. On average, principals devote 19.5 percent of their time on design or technical activities and 54.6 percent of their time on management tasks. Contact Mark Zweig & Associates, (508) 651-1559.

Clients consider communications skills more important than technical competence in the firms they work with, according to an article in *Principal's Report*. A personality test given to firm managers revealed that they are more likely to resolve conflicts by themselves than to consult clients, but the *Report* suggests that discussions keep problems from escalating. Call (212) 244-0360 for information on the newsletter.





Robert Greenstreet discusses ways of reducing the risk in specifying new products.

Specifications: Precautions with New Products

The specification of new products is a task that should be handled with some care to avoid a number of potential problems. As a written document, the specifications can contain errors or ambiguities that are preserved as damning evidence. Problems detected there are likely to be held by the courts as the responsibility of the architect, unless perhaps the errors were sufficiently obvious that the contractor should have called attention to them.[1]

This is particularly a concern when specifying untried materials. However, where a new product is considered important to a project, there are a number of safeguards that can be employed which, while not rendering the architect immune from claims, can lessen their likelihood.

Prior to specifying a new product, the architect should obtain and document as much information about it as possible. This can include all technical information the manufacturer publishes, as well as any other useful information it can provide, particularly details of when and where the product has been used before.[2] Inquiries directed to the architect, owner, or contractor of projects where a product was used can yield valuable insights into its installation and longevity. The number of previous projects will also give some indication of how much the product has been used under field conditions.

The manufacturer's information should not be relied on without additional supporting data. In fact, sole reliance on manufacturer's data can lead to successful claims against the architect if a product subsequently fails.[3] Approvals from recognized standards institutes provide an unbiased, objective review of the product's performance under specific conditions and should be required whenever possible to supplement and substantiate the claims of the trade literature. In some cases, the architect should consider recommending additional testing if any doubts remain.

In addition to getting product data, securing information on the manufacturer may also provide some assurance, specifically with regard to its coverage of warranties, its past performance, financial stability, and commitment to ensuring the correct use of products. This last point is particularly important, as manufacturers are likely to claim that improper use or poor installation is the real cause of failure, rather than any inherent flaw in their product. Consequently, manufacturers should be involved in the design and construction processes as much as possible; they should be informed specifically of the intended use of the product and their comments, in writing, should be requested regarding any foreseeable limitations. When the specifications are complete, the manufacturer may be asked to approve them, again in writing, and may even be asked to prepare shop drawings of the specific assembly. Alternatively, if the contractor prepares these drawings, the manufacturer should then be asked to approve them prior to construction.

During construction, it may be prudent to request the presence of a manufacturer's field representative to certify that a product was installed according to instructions. Written certificates, in addition to warranties, place manufacturers firmly behind their product and its specific installation in the building.

The owner, too should be made aware of the potential risks involved in using a new product and of the architect's attempts to minimize them. Written approvals to continue with the work should be regularly secured from the owner, usually at the end of each phase of the architect's services. The contractor should also be involved. Adequate information on the product should be included in the specifications, and the contractor should be allowed to object only prior to the bid opening.[4] If the architect wishes to observe the installation of the product – a wise additional precaution – the contractor should be notified well in advance, and records of any visits rigorously maintained. These may include a written field report, photographs, and even a video recording of the installation. Of course, no amount of checking and testing can ever fully eliminate risks associated with new products. All the architect can do is to assess the product as carefully as possible and to engage all parties in the final selection and installation processes. This action essentially achieves two objectives.

First, it ensures that the maximum amount of information and number of qualified opinions are solicited on the product and its specific installation. The combination of expertise from design, construction, and manufacturing viewpoints should provide a solid basis upon which to use the product, especially when backed up by warranties, certificates, and letters of approval.

Second, it provides the architect with a strong defense should anything go wrong. While the profession doesn't warrant perfection, it is possible to demonstrate that the architect did everything expected of a responsible professional and should not therefore be held liable for faults beyond his or her control. Demonstrations of the care and thoughtfulness with which the architect checked out the product, consulted with all parties, explored the specific use of the product, and carefully monitored its installation can go a long way in mitigating liability. Of course, written documentation throughout the process is imperative, and all discussions and decisions made by letter, meeting, or telephone should be scrupulously recorded.

New products should not be avoided simply to limit the architect's liability. With careful investigation, collaboration, and detailed record keeping, the architect can achieve the appropriate and successful use of new products and can demonstrate a professional approach to material selection that acts as a strong defense against future claims.

Robert Greenstreet ■

The author is dean of the School of Architecture and Urban Design at the University of Wisconsin-Milwaukee.

Notes

1. D'Annuzio Brothers Inc. v. New Jersey Transit Corp. 586 A. 2d 301 (N.J. App. 1991).
2. Martel, J. "Safeguards in Specifying New Products." Guidelines for Improving Practice. Volume 1, Number 4. (V.O. Schinnerer & Co.).
3. Bloomsburg Mills v. Sordonic Const. Co., 401 Pa. 358, 164A. 2d.201. (Pa 1960).
4. See note 2.

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Robert Gutman and **Larry Hirschhorn** lay down some principles for passing on the ownership of a firm.

Management: Transferring Ownership of a Practice

Many more firms than ever before in the history of architectural practice are struggling with the question of how to transfer ownership and control from the current generation of partners to the next. Through our observations of practices, we have formulated a number of principles that are useful in planning transitions. These principles cover both the image the firm intends to project to potential clients and management attitudes for dealing with the structure of practice.

1 *Direct the firm toward service and away from an emphasis on design aesthetics and style.*

There has been a considerable, perhaps a growing tendency, to identify the work of a practice with the design imagination of a specific architect. Over the long run, such an identification makes it more difficult for the practice to endure into the next generation. Why should anyone continue to hire the firm once the big talent retires or dies? This is a major reason for emphasizing the firm's commitment to service and to producing sound buildings that maintain their value despite fluctuations in style and taste.

2 *Realize that if the firm is going to continue, it has to be different from what it is today.*

When firms are successful, they often attribute their achievement to the particular personal qualities of the partners. Even if the interpretation is valid, the view can be a burden on those who are planning the firm's future. It often results in an unfortunate tendency to cling to the same marketing strategy and management system that worked in the past, and to find a new generation of leaders who duplicate the traits of the retiring partners. The building scene is in constant flux, and architecture is one of the most volatile segments of the economy, so a transition plan must assume that if the practice is to continue it will probably require architects whose background, experience, and skills are different from the current leadership. It may also demand a new way of organizing the practice.

3 *Build the firm's capital value.*

Probably most practices have learned by now that the worst thing partners can do if they wish their firm to survive is to raid the till annually of whatever profits come in. As in any enterprise, long-run success goes to those who husband their resources. A healthy capital fund bolsters the capacity of a practice to cope with the frequent shifts in market conditions that are commonplace in architecture, and substantial financial assets make it possible for a firm to assure partners that they can leave confident that their retirement income is reasonably safe. These assets are also a lever with which to secure the loyalty of younger people in the firm who are concerned about their prospects for advancement and economic security.

4 *Proceed cautiously in running the firm as a "family business."*

Enterprises in all the professions often model themselves on family businesses. There is a tradition for this in architecture: We all know of prominent firms that have installed sons, daughters, and sons-in-law in central positions, even within the last few years. Family members who are talented and skillful should not be ruled out as leaders; however, it is important that their selection be based on merit rather than on just kinship ties. Since others inside and outside the firm will always suspect that kinship won out over merit, it is important to publicize the achievements of family members as part of the transition process. Other talented members of the staff should be promoted at the same time, to show that kinship ties are not the dominant consideration.

5 *Seek out repeat clients.*

The prospects for inter-generational survival have been enhanced tremendously in architecture by the emergence of clients who conduct extensive building programs and by the lengthening of the time it takes to complete projects. These trends have given clients an incentive to rely on practices they have used before, and in turn, have made it more feasible for practices to imagine a life for themselves beyond the current generation of principals. Research has indicated that for the average practice, repeat business constitutes as much as 70 percent of work load at any time and that the more repeat business a firm has, the greater its chances of survival. The implications for the manner in which practices handle their relations with clients are evident.

6 *Clarify ownership transfer arrangements so that they are easily understood by current partners and younger people in the practice.*

Most practitioners have gotten the word that they must make some formal provisions to transfer ownership and control of their firms if they wish to gain the benefits of a firm's continuation. They have learned this from other architects, and they certainly hear it from their attorneys and accountants. One big mistake many practitioners make, however, is not to begin early enough to establish an ownership transition plan and to prepare themselves psychologically for a reduced role in the firm. In turn, the new owners often do not give sufficient consideration to the methods by which former partners can make their experience available to the practice.

Partners and principals are understandably touchy about ownership transition, particularly when they are uncertain about who will and should succeed them in leadership roles. A clouded, veiled atmosphere in discussions of the subject, however, is especially disturbing to younger persons in the firm. After all, their future hangs on the transition plans, so nothing is more important than to make clear to all staff members the terms by which they can become stakeholders. These are basic principles that should be kept in mind when architectural firms consider the transfer of ownership and control. Each principle, however, requires further elaboration to make it useful to the specific requirements of particular practices.

Robert Gutman, Larry Hirschhorn ■

Robert Gutman is on the faculty of the School of Architecture of Princeton University and the author of Architectural Practice: a Critical View. *Larry Hirschhorn is a principal in the Wharton Center for Applied Research, a management consulting firm in Philadelphia, and the author of* Managing in the New Team Environment.

“Joe is very availab

T. Graham Bradley is a principal of Bradley Likins Dillow Drayton, AIA, a 60-year-old firm located in Decatur, Illinois. He is a Fellow of the AIA and a past director of the national AIA. He is also past president of both the Central Illinois Chapter of the AIA and the Illinois Council of the AIA.

T. Graham Bradley

Joe Murphy is president of Insurance Designers, an independent insurance agency based in Petersburg, Illinois. He is a member of the Professional Liability Agents Network (PLAN), a nationwide group that specializes in serving the risk management needs of design professionals.

Joe Murphy

There's no typical day for Joe Murphy, but at least a couple of days a week you'll find him driving 250 or so miles in several different directions to: spend two hours discussing loss prevention with an architect and helping him fill out a DPIC application, two hours talking about a structural engineer's changing practice and completing a renewal application, another hour talking about project insurance with another architect, and more time with another renewal application. He met Graham on a trip like that about eight years ago. Graham had a problem on his professional liability policy and Joe helped straighten it out.

Joe says, “I don't think you have to come on strong—I think it's just being there when they need you. You finally get to the place where, when they think they have a problem, they call you—they just plain can't think of anyone else to call.”

Joe's spent over 20 years in the insurance business, and nearly ten representing DPIC. Today he can hardly remember the days before he knew about professional liability for design professionals: almost 100% of his time is spent with architects and engineers. Because of his expertise and his proximity to the state capitol, he works with Graham and other design professionals to provide input to policymakers, working with government bodies like the state Capital Development Board, which handles all renovations and new buildings for the state. He's a “reference point” for them—their sounding board on what the insurance industry thinks about contractual clauses under discussion with the AIA, ACEC and others. If you're a design professional in central Illinois, you'll see Joe Murphy.

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"Joe's knowledgeable about what we do. He'll come in and talk to the partners about contract review and loss prevention—from there it's passed along to our staff. When we have a new form of contract that looks like there might be an oddity with it, Joe is the first one we call. Usually when a contract is presented to you, you don't have a lot of time to fool around with it. They expect you to almost get it back in the return mail. And, after all, it's a business arrangement that we're anxious to do, too, so we don't want to sit on it. But we don't want to do anything that negates our insurance, either. Joe's very cooperative and helpful. He'll get back to us right away with an answer. So we really feel that we can proceed without risk or with minimal risk.

"Before Joe, we had agents who, by comparison, knew almost nothing about the coverage. They were just selling something. When Joe called on us and wanted to quote our policy, for one thing he had a better quote. Not only that, he services his clients and that makes all the difference in the world. What's really impressed us about Joe and DPIC is the service aspect—unless the premium costs were vastly different we wouldn't be inclined to change.”

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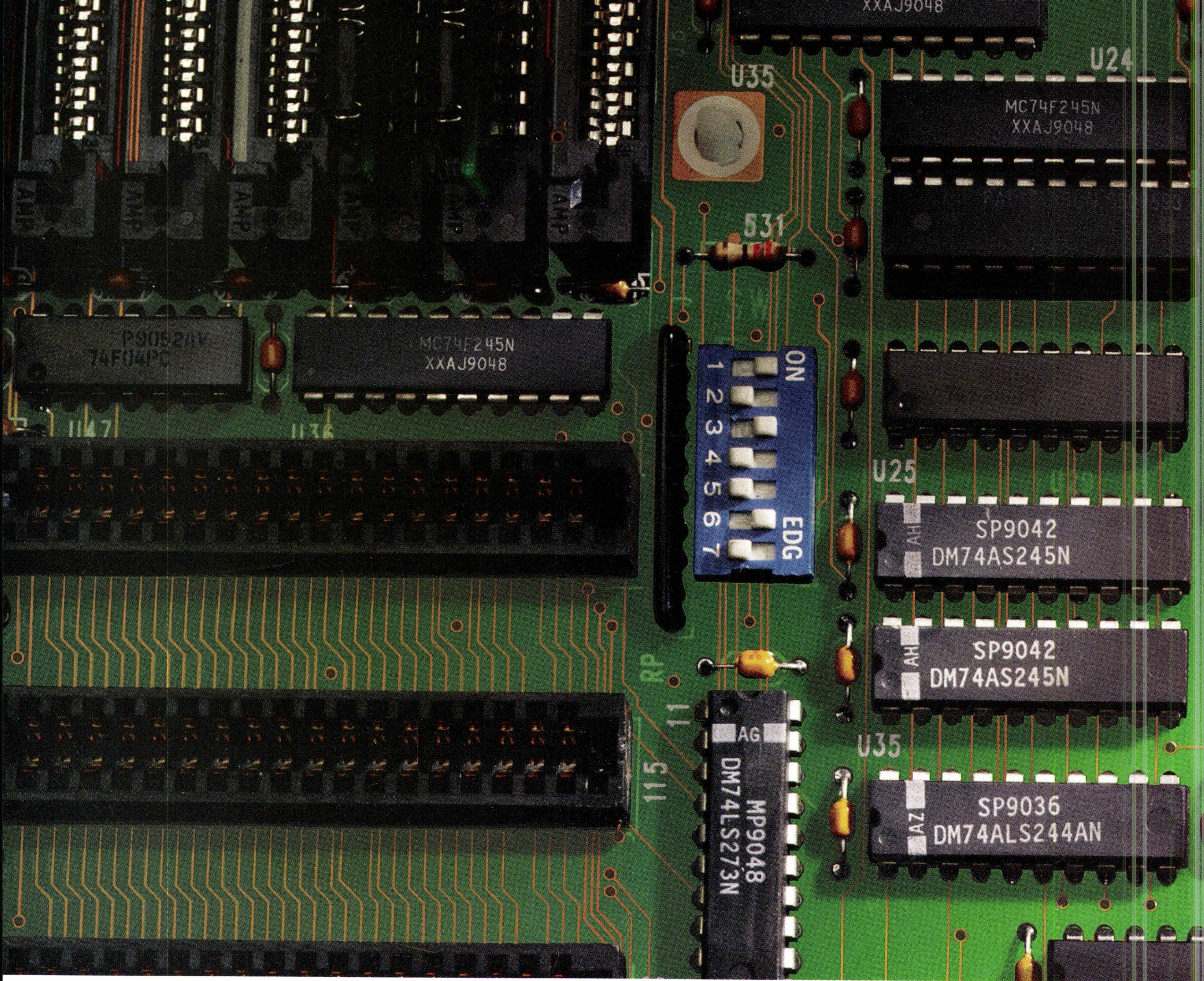

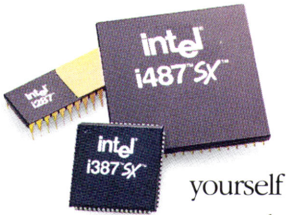
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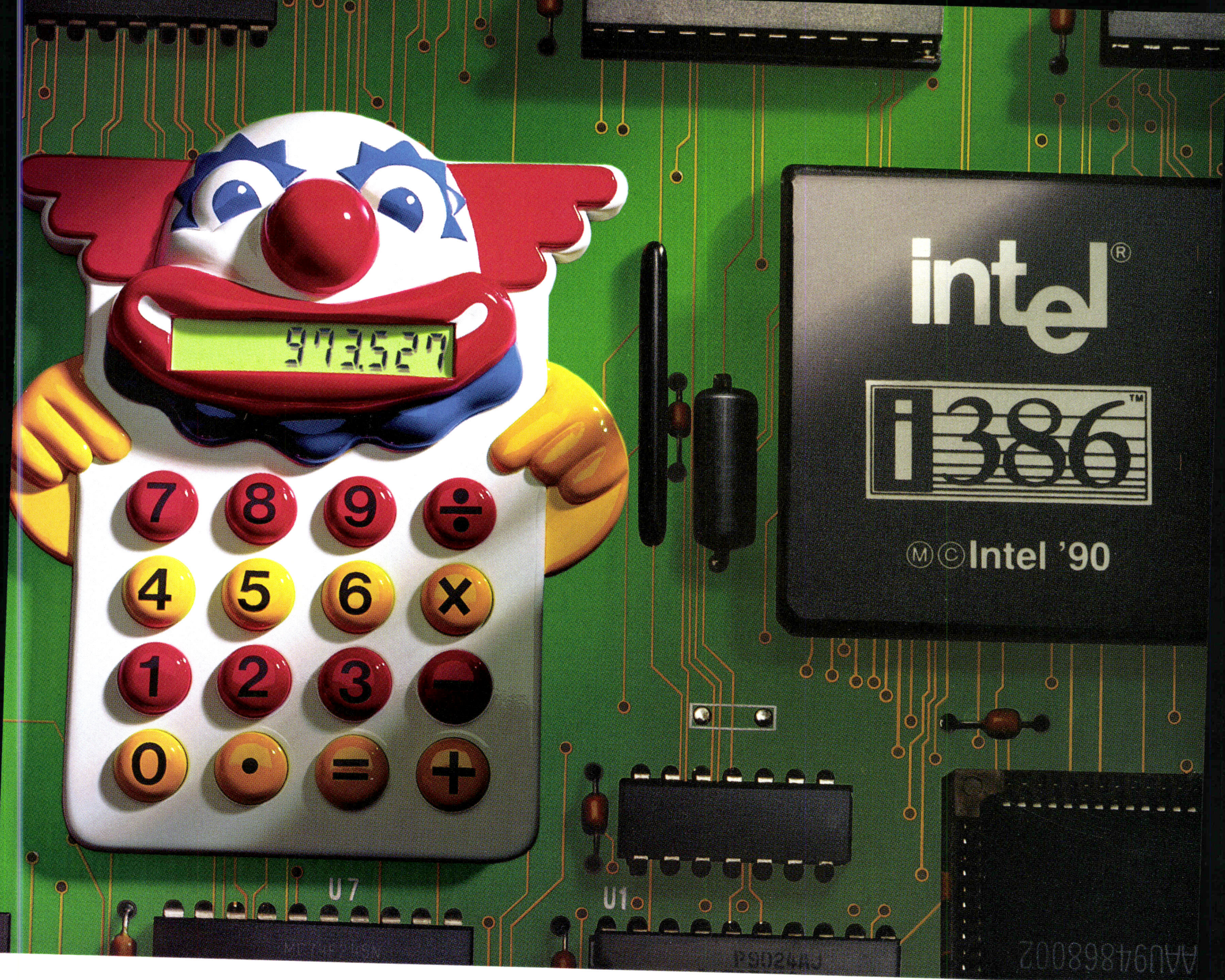
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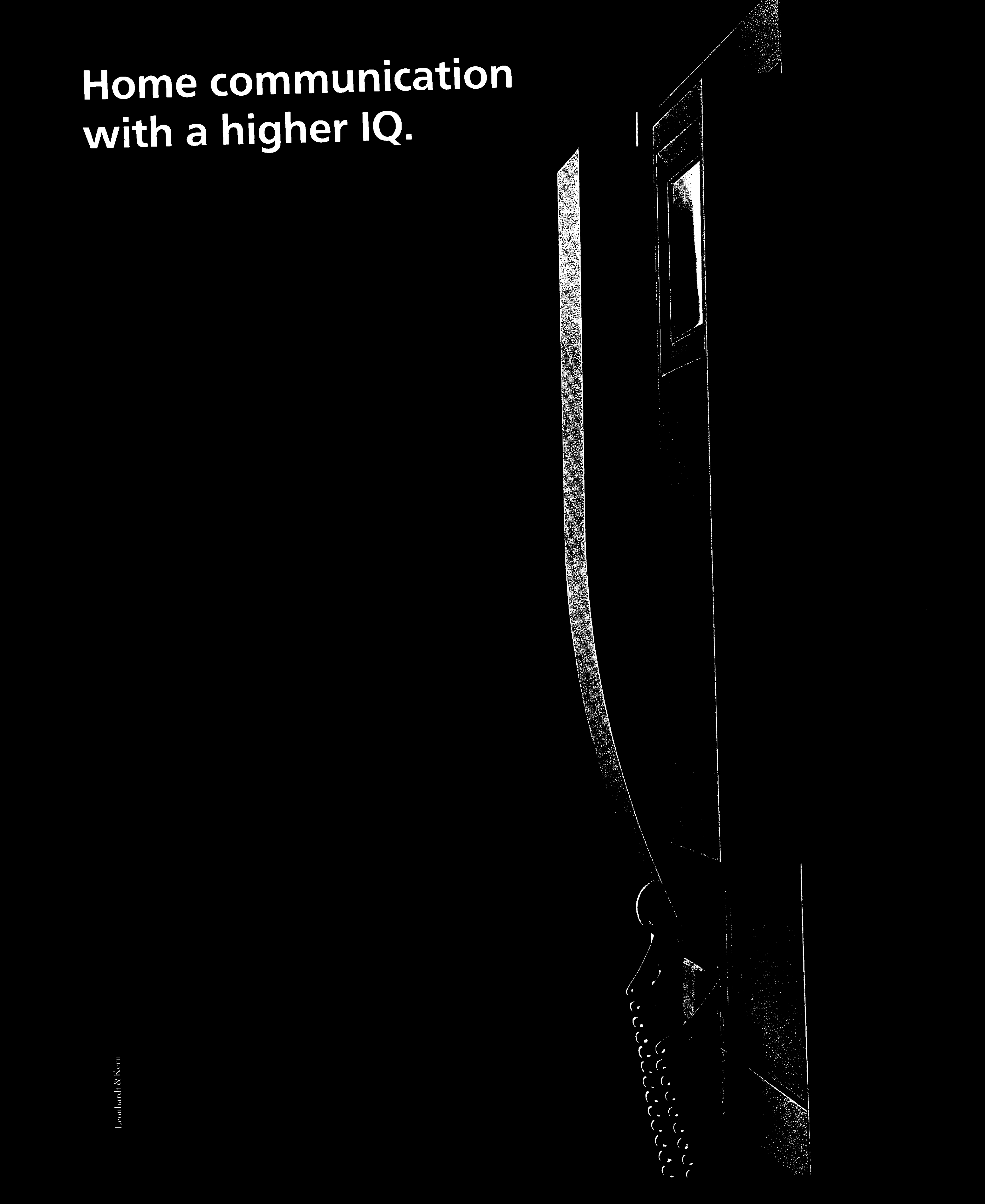
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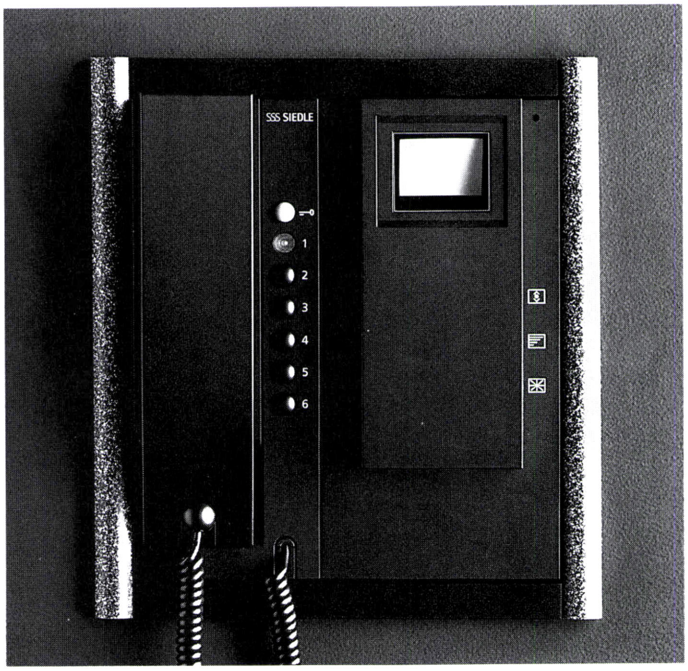

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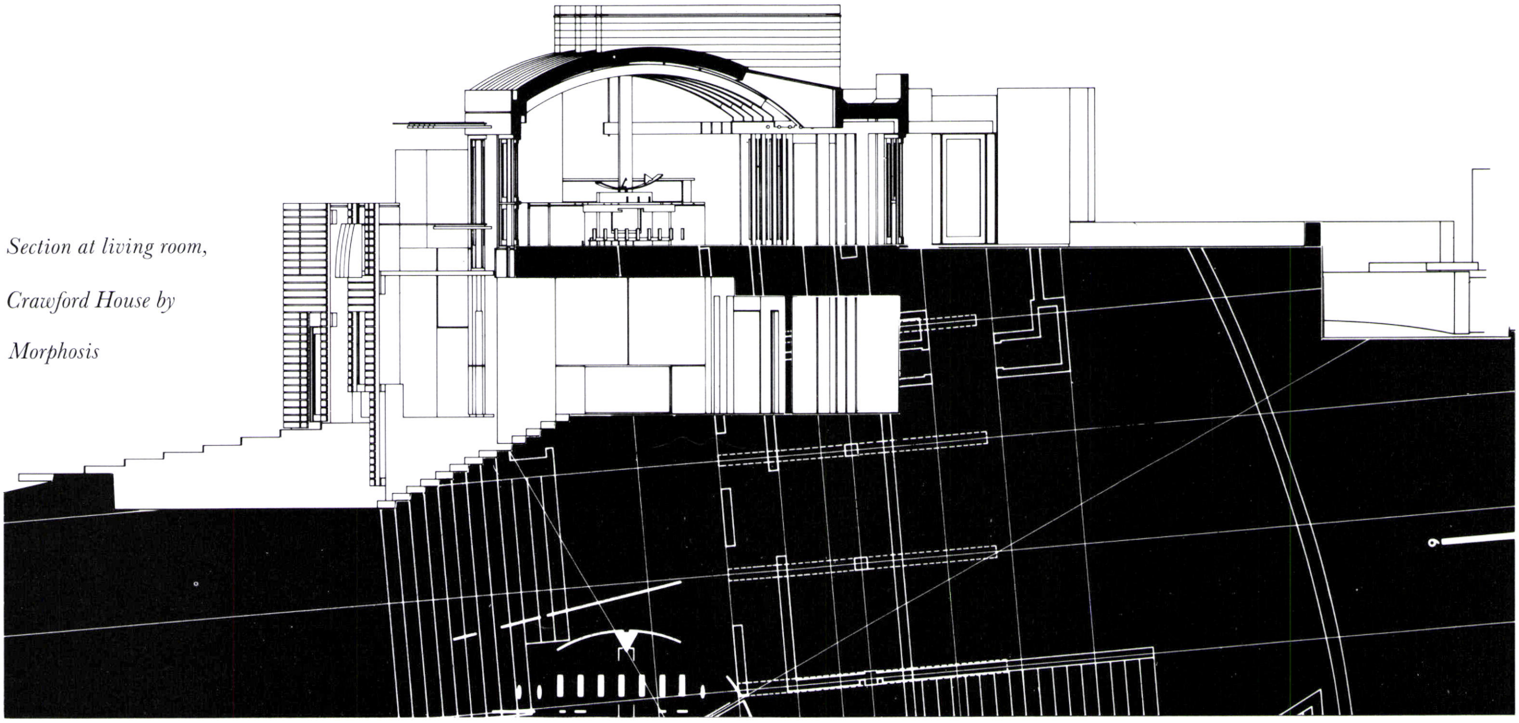
Houses and Modernism

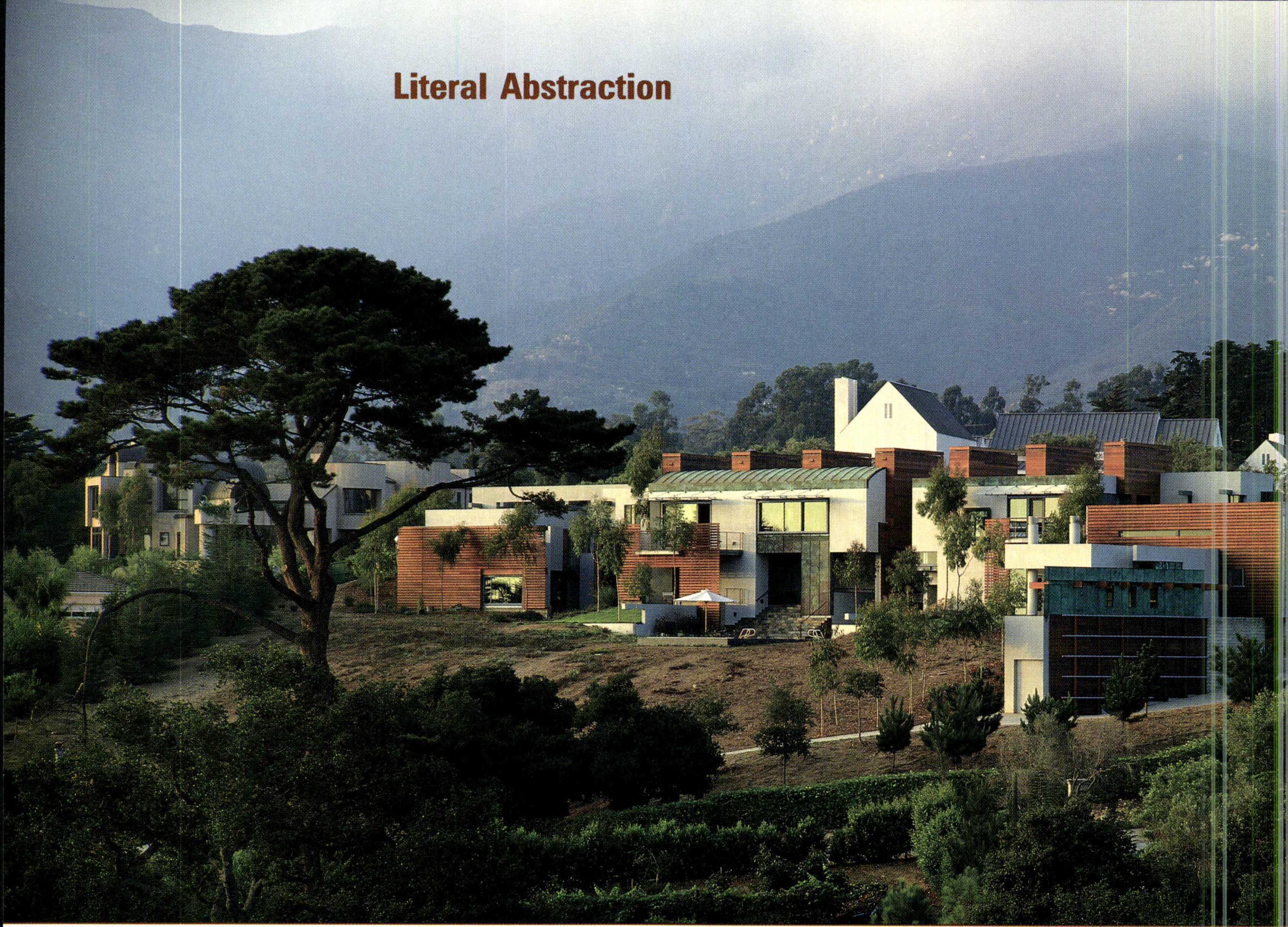


Section at living room, Crawford House by Morphosis

In our annual issue on houses, we look at how architects use the language of Modernism – and why.

Because all of the projects in this annual issue on houses – though they are undeniably diverse – employ the abstract language of Modernism, we asked the architects for their thoughts on the Modern movement and how it informs their work. The answers vary as much as the work. Some, like Steven Fong (page 75) and Mark Mack (page 64), devote their attention to the examination of Modern precedents: in Fong's case, Le Corbusier's revolutionary prescriptions for living; in Mack's, the theories of Adolf Loos. Others, like Morphosis (next page) and Ada Karmi-Melamede (page 70), unselfconsciously accept the Modern language as a beginning for other explorations. Both approaches, though, demonstrate that the Modern is still alive today; it is not just another historical style. **Mark Alden Branch**

Literal Abstraction



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A synthesis of sometimes contradictory ways of thinking

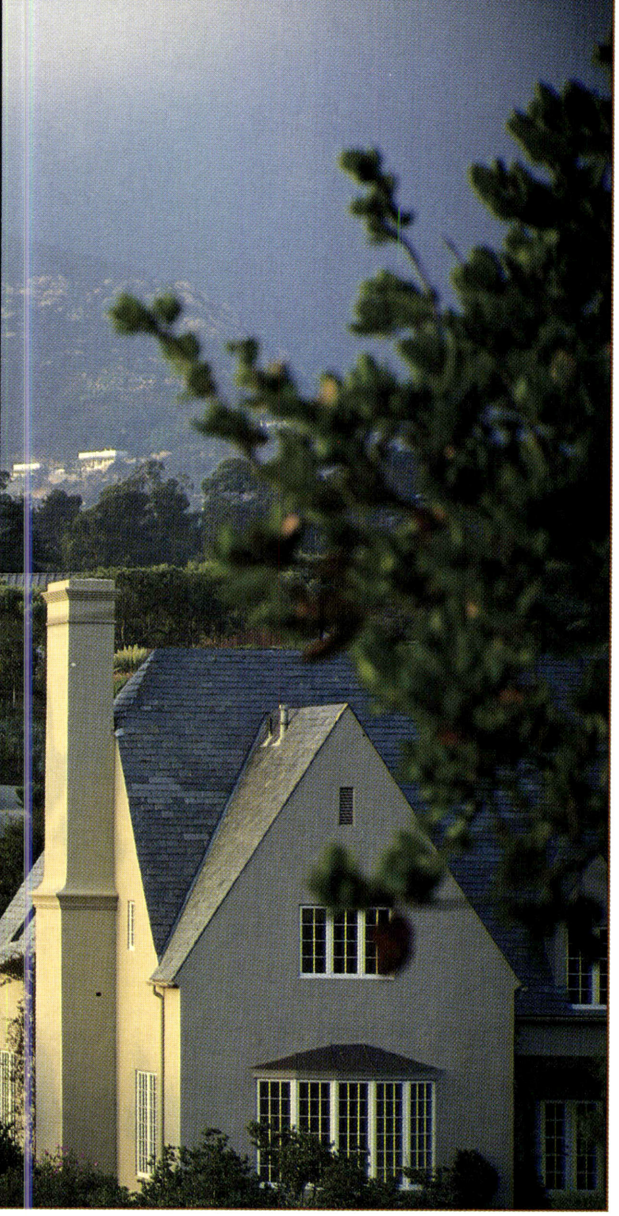
creates a new house by Morphosis.

Only from a hillside southwest of the house can the full extent of the house be seen (1); from the street side (2), the slope and the placement of the house cause it to recede into the hill. Approaching through the gate in the arc of the wall, the visitor descends a short distance to begin the entry sequence, through the concrete portal (3) and up the steps. The focus here is through the slot ahead, over the triangular fountain/pool and through the house to the lap pool and view beyond.

Can Stonehenge embrace a contemporary lifestyle? What happens when abstract and literal become a single reality? When sophisticated clients and sophisticated architects come together, such issues become pertinent ones, and the results can be stunning. All of this took place in the creation of the Crawford Residence (P/A Citation winner, P/A, Jan. 1989, p. 84), a collaboration of Morphosis with Bill and Joan Crawford.

In the beginning, architect Thom Mayne of Morphosis recalls discussions that dealt with such notions as Stonehenge imagery, nature's cycles, diurnal patterns, and other abstract (not purely pragmatic) concerns. Overlaying that were the influences of the clients' history, and how the architects' earlier work was seen to embody the meaning of "house" in the less abstract sense. Of the ideological direction, Mayne says, "Our own goals for the house were somewhat more abstract, and the 'houseness' had to do with the collective enterprise of the clients."

When the process began, the immediate area of the gently but emphatically sloping 2.4-acre site was largely not built up, and commanded a view southwest toward the ocean half a mile away. It



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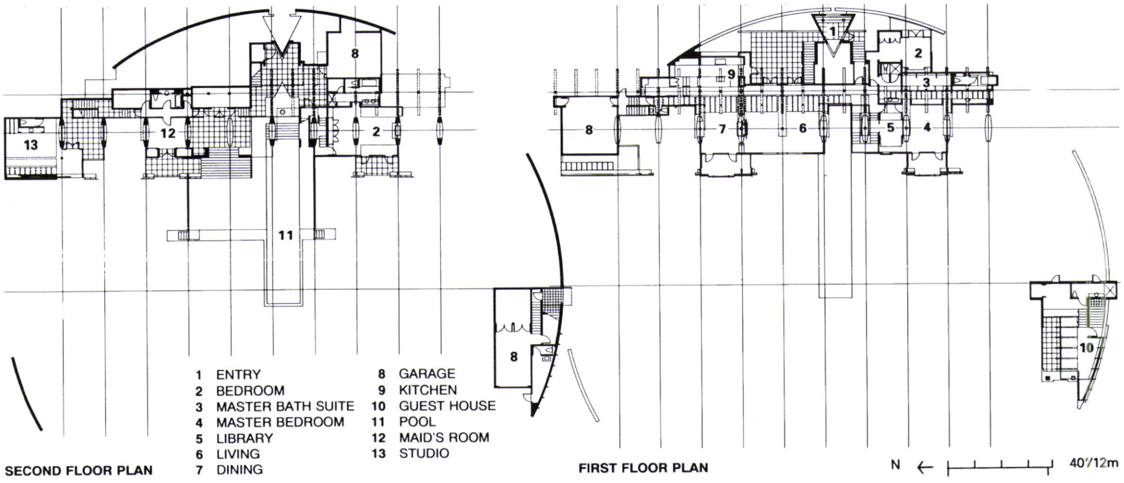
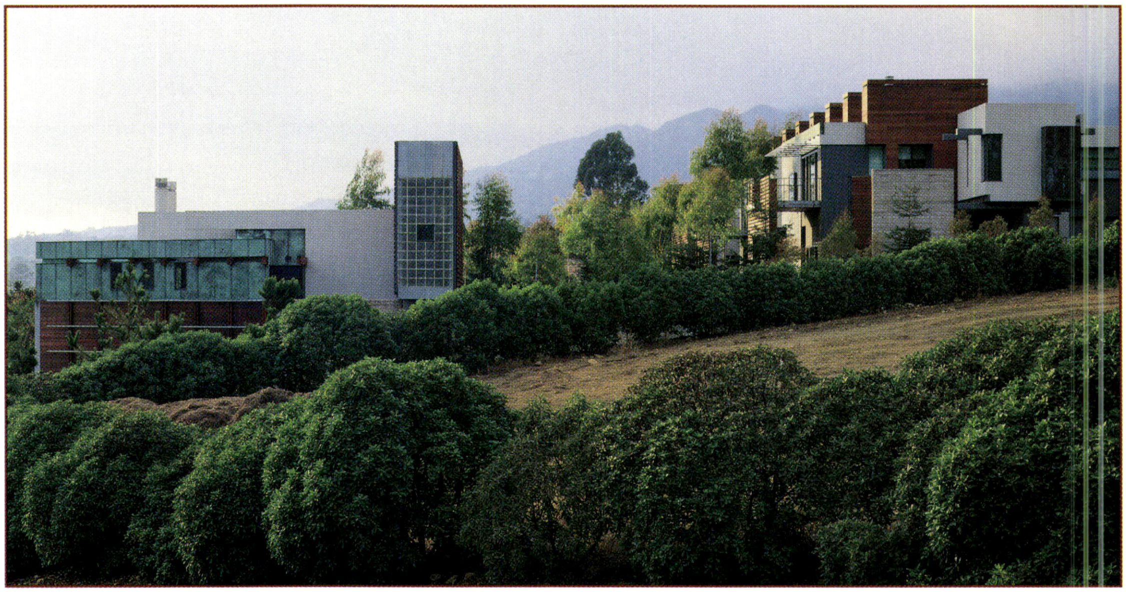
goes without saying that land costs here were never low, at least within recent memory. Now the area, affluent but developed, boasts numerous expensive homes of doubtful design lineage, many too ostentatious to be banal. To be fair, perhaps two or three of them have the good manners to be spare, and are therefore inoffensive. And when fog does not intervene, as it did most of this past summer, the ocean view is still largely intact.

Organizational systems external to the actual architecture – but established to shape the way the house makes use of the site – were employed as a basis for the design, beginning with references to the Mercator grid, seen by the architects as implying global connection. A second reference is to the axis of the major view, with a series of linear progressions perpendicular to that axis, representing "lines of force." The third component of these systems comprises the fragments of an arc formed by the enclosing wall, which the architects see as the representation of an "idealized notion of private ownership and the many implications associated with 'wall.' " Pylons, structure, and walls are arranged in an arithmetic progression to form the elements of the design, the spaces between are the





4

second half of the architectural dialogue.

At some point, Mayne observes, the collaboration brought about an interaction between the abstract and the more conventional vocabularies. At the same time, he points out, the geometry of the structure was not intended to create perfection, in the Miesian sense, but to create a way to deal with the more idiosyncratic aspects of design. Using mathematical formulae as an example of the achievement of perfection, Mayne sees the progressions in the house as only a framework which could then be eroded and carved away, yielding the design resolution. To understand how the house occupies the site, he feels that it is necessary to recognize the kinetic characteristics of it, its implications of movement. Essentially divided into four pieces, the house moves around the arc in garage/studio, main living, bedroom, and guest house components. Beyond that, the design is seen as a series of events, generating a tension between the systematic and the idiosyncratic. Although the house looks complex in plan, the functional zoning is logical; the four components appear to work.

While the house is large, its full presence definitely is not felt from the street, as grade on that side is below curb level; it seems to be a low one-story house with its rhythmic procession of seven light monitors. Its full extent can be perceived from the nearby hills, and to some extent from the rear yard. The rear elevation, which Mayne is least happy with, will be masked – and completed in a sense – when vines take hold on the wooden trellis panels, as they are intended to do. A years-long water shortage has seriously slowed plans for site planting, which will proceed as conditions permit.

Perceptions of the house from off-site were important, because of the owners' original intent to make the house a good neighbor, to avoid

(continued on page 61)

Seen from the side (4), the detached guest house down the slope (left) completes the south segment of the fragmented arc. A grand stone staircase descends from a covered patio on the back of the house (5) to the level of the lap pool (lower right). On the south end (6, 7), one of two master bathrooms projects out to a point of tangency with the line of the arc, making a counterpoint to the concrete pylon down the hill. The pylon is one of a progression of 10 "totems" along the long axis of the house, rendered in concrete, wood, or trelliswork – or just implied.

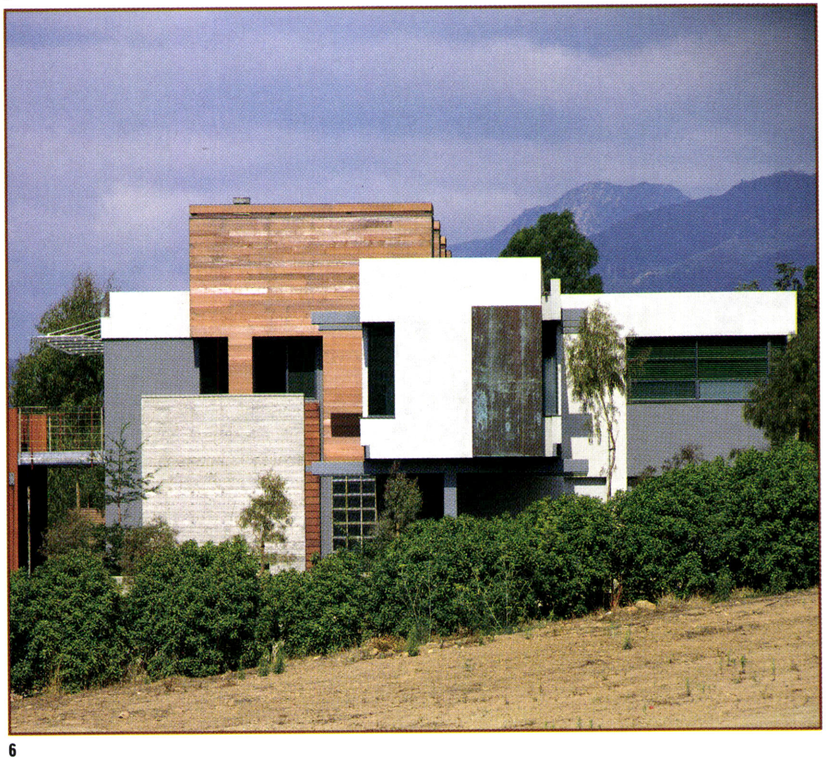
Modern vs. Modernist

While it is a recognized tenet that all architecture springs from some inspiration or mixture of inspirations, it is difficult to attach any particular reference to the work of Morphosis. Thom Mayne acknowledges a large debt to his professor, Ralph Knowles, at USC, but Knowles's teaching cannot be cited as a direct contribution to the designs themselves. Certainly, Frank Gehry has had a broad influence over work in Southern California. Its effect is not easy to characterize, however, beyond furthering permissiveness in the field, ground already broken by Venturi and Moore.

Mayne, however, would prefer to discuss the Crawford house as a continuation of previous Morphosis work, drawing most of its expression from within, rather than from without. He considers himself to be a Modern architect, as opposed to a Modernist, because he doesn't make any attempt to "look like Mies, or look like Corb." When asked who might have influenced the work on this house, he responds, "I haven't thought that way for years; there's no one looming over me at this point in my life." In a forward to the Rizzoli book *Morphosis: Buildings and Projects* Mayne and Michael Rotondi wrote, "Tradition and history are used [by us] as the groundwork for new organizational and conceptual ideas in a time when much of architecture is preoccupied with accomplishments from the past and their literal interpretations."

Mayne cites the Flores house addition (P/A, Jan. 1980, p. 120) as one of several Morphosis projects from which ideas have grown, pointing out the topiary wall and the vaulted dining space as precursors to the vaulted living room and the vine-covered trelliswork here. He also recognizes some of the developing ideas as in direct line with Knowles, of whose work he says, "All of it had to do with essentially repetitive, natural, earth processes." The desire to "push the Crawford house into the ground," and the further refinement of that concept in the future Golf Club in Chiba Prefecture, Japan, can be seen to have clear ties to Knowles.

5



6

7

Located below and behind one of the garages, artist Joan Crawford's studio (8) draws light from a high sloped skylight. Ample space and ceiling height will accommodate large-scale works and a large sliding glazed sash will facilitate movement of such pieces as well as opening up the space to the rear yard. With access to the front court and generous east light from large windows, the kitchen (9) is also largely open to the dining room and the living room beyond. The "heart of the matter," as Mrs. Crawford calls it, is the living area (10), with its wood-paneled, vaulted ceiling and continuous band of skylights along one edge – and its view over the valley to the ocean views. Dining is beyond the fireplace.

8

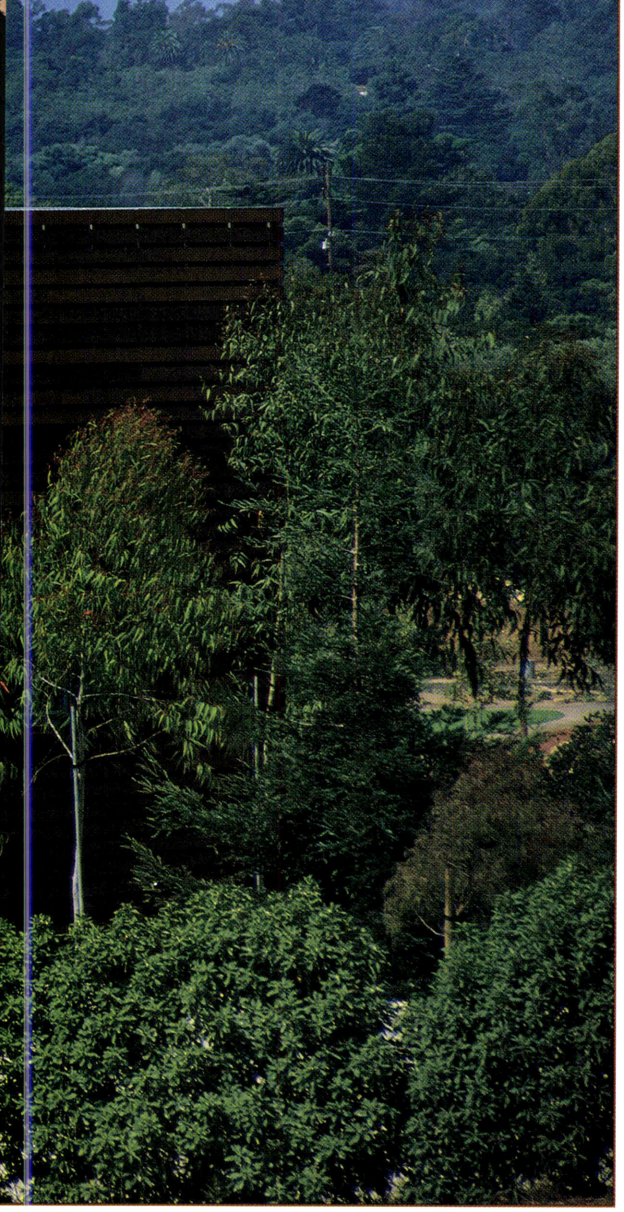
9

10

11

Although small, the guest house combines the palette of materials used on the main house. On the entrance/driveway side (11), openings toward the distant neighbors are limited to three narrow windows, glazing between protruding roof beams, and a clear square in the middle of the tall glass block wall of the shower. Entry is under the shower projection and up steps to the left. Opening to the rear yard of the main house (12), the guest house has floor-to-ceiling glazing onto a terrace. The shower enclosure is minimally detailed clear glazing (13) adjacent to an equally minimal sink (center). Each of the two glazed openings in the side walls is flanked by a cabinet within the thickness of the wall. The living area (14) has bookshelves on the south wall (left), a small desk toward the building's point (background), and glazing and fireplace in the direction of the view.

12



13

(continued from page 56)

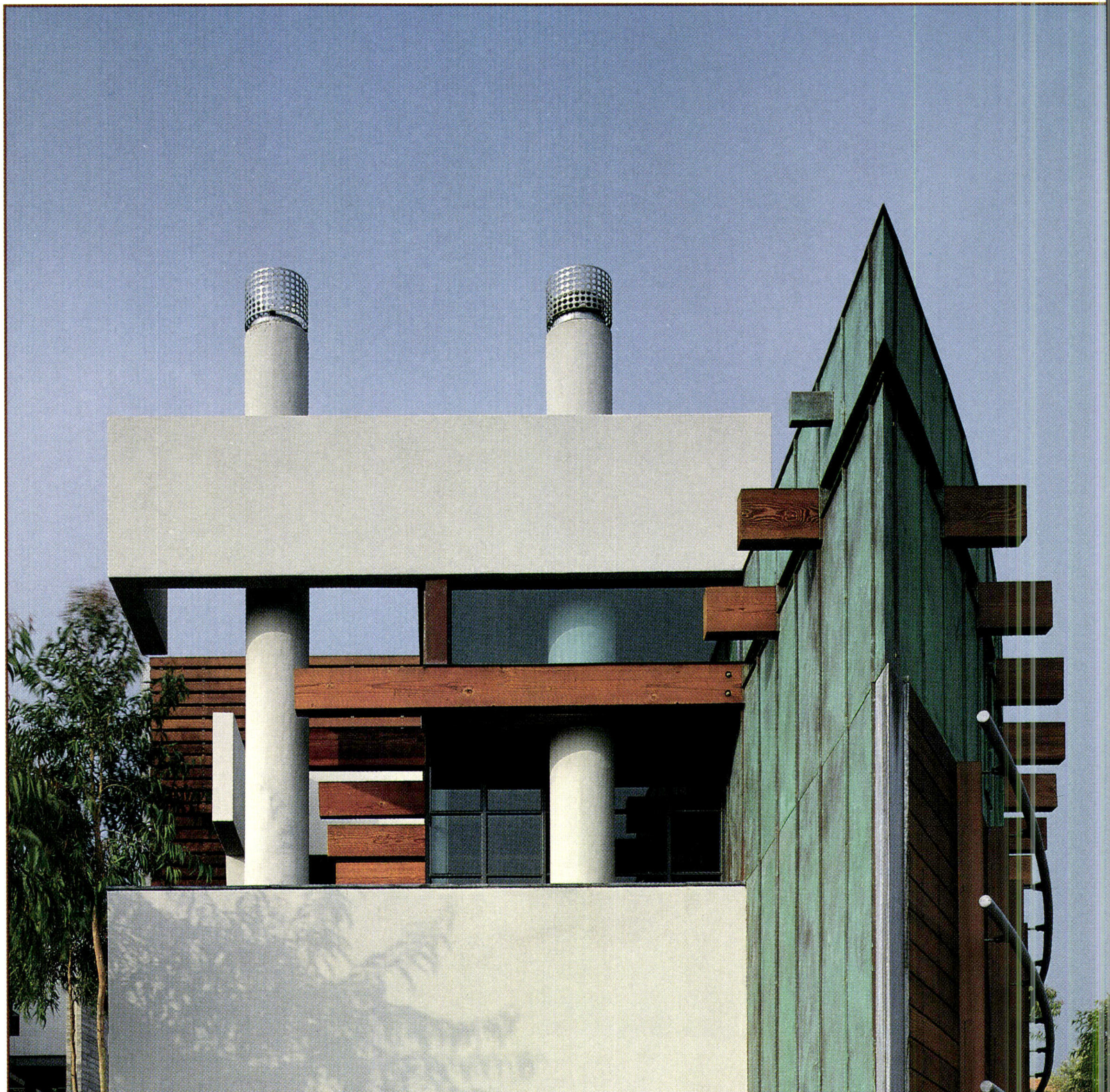
making it a major visual intrusion. A step in what Mayne sees as a continuing direction for him, the house is pushed into the ground as much as possible, a characteristic achieved magnificently on the front. He looks forward to the time in a few years when the trees will be 30 feet high, and the landscaping will have reclaimed prominence, much as it now has in older parts of the town.

From the parti to the siting to the detailing and the execution, the Crawford residence is a tour de force in the best sense – a quiet one. It is a masterful orchestration of thoughtful planning, sympathetic materials, skillful massing, and an overall elegance in proportion and joinery, affirming once again that talent, combined with discerning clients and quality craftsmanship, can produce excellence in architecture. **Jim Murphy** ■

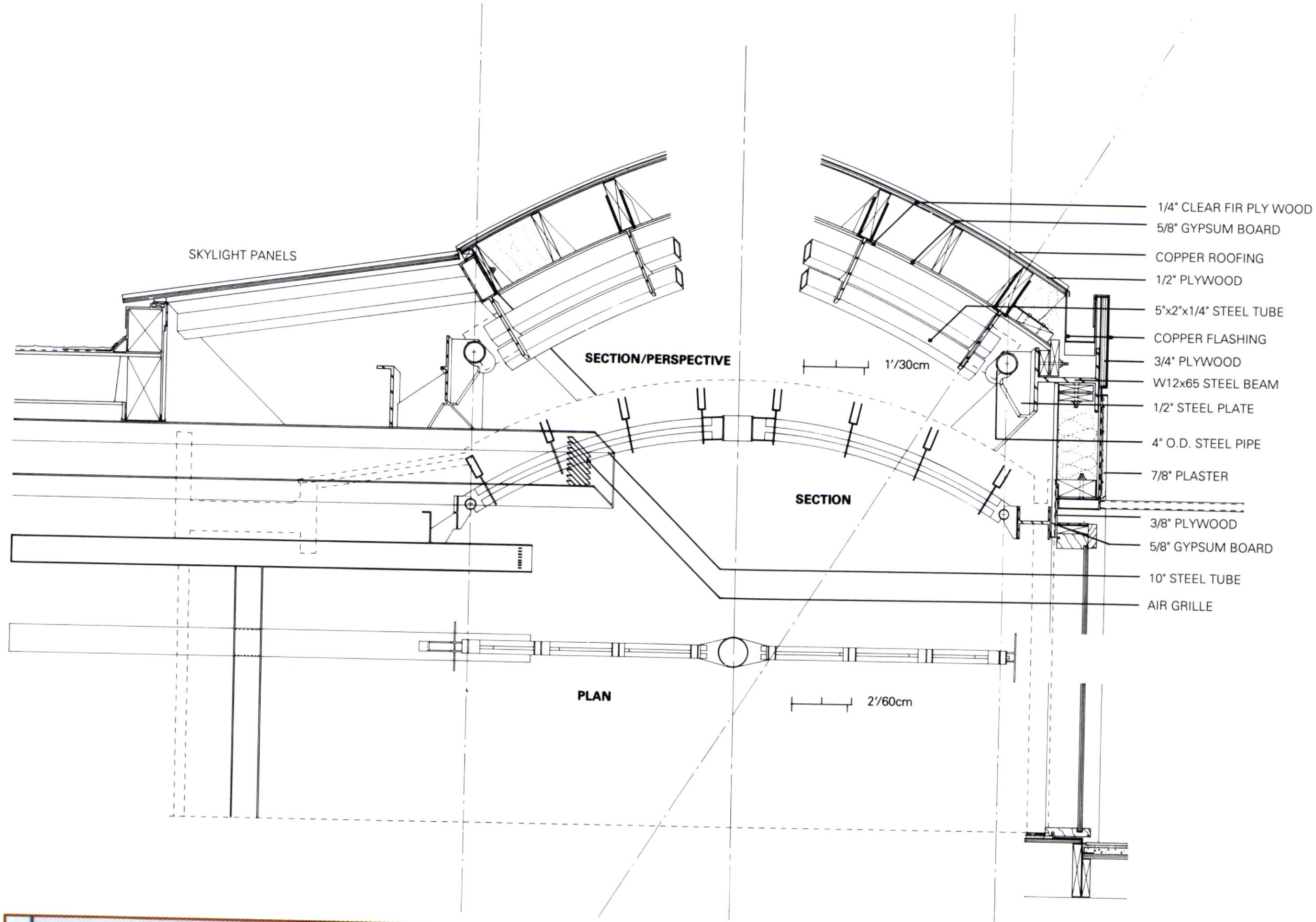
14

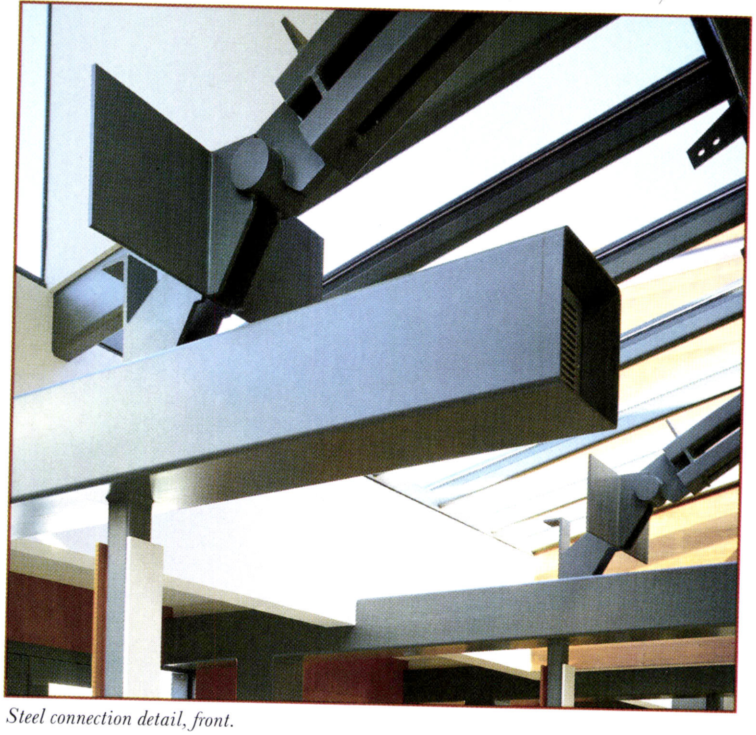
At the end of the last segment of the arc is the copper-clad prow of the guest house, the lower level of which comprises a garage and a storage area.

Project: *Crawford House, Montecito, California.*
Architects: *Morphosis, Santa Monica, California (Thom Mayne, Michael Rotondi, principals; Thom Mayne, partner-in-charge; Kazu Arai, Robin Donaldson, project architects; John Enright, Richard Lundquist, Martin Mervel, Maya Shimoguchi, Ann Zollinger, project team; Brigit Compans, David Guthrie, Jason MacDonald-Hall, Patrick Hurpin, Tom Lasley, Tom Marble, Mehran Mashayekh, Katie Phillips, Michael Sant, Remko Van Buren, Dukho Yeon, Craig Burdick, Jun-ya Nakatsugawa, assistants).*
Clients: *Bill and Joan Crawford.*
Site: *2.4 acres with moderate slope to the southwest, one-half mile from the Pacific Ocean.*
Program: *house with four bedrooms, an art studio, and two garages (7800 gross sq ft); primary living areas were to be near the level of the street. Guest house (650 gross sq ft) includes living, kitchenette, sleeping, and bath areas, and a long garage to hold a limousine (1100 sq ft).*
Structural system: *concrete slab on grade with concrete footings and grade beams; structural steel frame with wood stud and beam wall structure; some cast-in-place concrete structural walls.*
Major materials: *(exterior) standing seam copper panels, clear redwood siding, concrete, and painted sheet metal and exposed structural steel; (interior) painted gypsum board walls, clear Douglas fir plywood, oak floors, painted structural steel (see Building Materials, p. 146).*
Mechanical system: *gas-fired forced air heat, conveyed through structural steel tubes.*
Consultants: *Susan Van Atta & Associates, landscape; Erdelyi-Mezey (main house), Joseph Parazelli (guest house), structural; Sullivan & Associates, mechanical; Saul Goldin & Associates, electrical; Flowers & Associates, civil.*
Contractor: *Paul Franz Construction.*
Costs: *not available.*
Photos: *Richard Barnes.*



Selected Detail




Steel connection detail, front.


Steel connection detail, back.

Steel Structure, Living Room
Crawford House

Typical of the detailing of Morphosis projects, the steel arch-and-tube structures supporting the living room roof and ceiling in the Crawford house are crafted assemblies, works of art in themselves. A composite drawing of the structure illustrates how the bowed roof deck rests on graceful arched bar members, the load from which is transferred through pinned connections at each end, either to the wall or to 10" x 10" steel tubes carried on 10" x 10" steel tube columns. Both the columns and the horizontal tubes also become ducts for heated air. Air release into the space is through grilles in the horizontal members and adjustable eyeball-like nozzles in the columns. ■

Ancient Solutions for the Modern Suburb

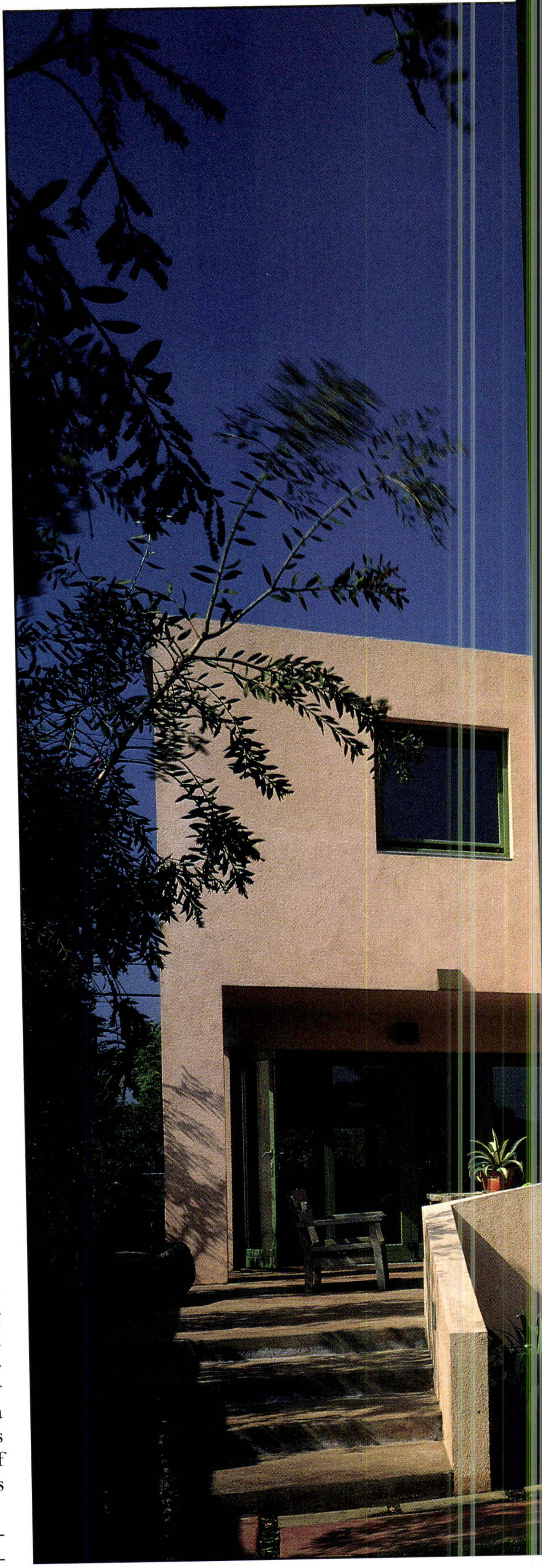
Inspired by Adolf Loos and the Mediterranean vernacular,
Mark Mack adapts Modernist prototypes to a
crowded Santa Monica neighborhood.

1

When seen obliquely from the street (1), the Summers House is a collection of boxes, with the studio in the foreground. A swimming pool lies between the studio and the house, rendering the front yard a semiprivate space, with cars relegated to the garage at the back of the site. Doorways, terraces, and stairways likewise mark a gradation from public to private (2): The formal entrance is to the far right, while the open door on the transverse wall links the front patio and the living room. A partially screened terrace, up a few steps, offers access to the stairways that lead to rooftop terraces.

This Santa Monica residence perfectly expresses Mark Mack's belief that Modernism means drawing on very old sensibilities: the human capacity to respond to comfort, light, and air. In the seven decades since two other Viennese architects, Rudolph Schindler and Richard Neutra, brought Modernism to greater Los Angeles, the ideal California house has always made the most of these sensibilities, and even flaunted them. Where else in this country can you have the sun and mild temperatures that encourage indoor-outdoor living without the humidity that brings insects and the requisite screens that inhibit the spatial flow? In the heyday of the Case Study Houses, cheap land inspired living on the ground plane, enabling one to circulate effortlessly between indoors and out. When land became precious, architects devised ways of raising the outdoors to the upper levels and the roofs of houses, thus producing a house form that is akin to the vernacular dwellings of Spain and North Africa, structures made of cubes whose horizontal planes serve as both roofs and terraces.

The Summers house is like these ancient Modern houses. Mack explains that its form was pre-



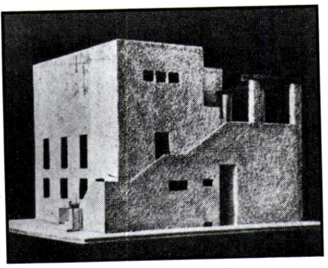
2

Modernism, as seen by Mack

Mark Mack discusses his search for an unselfconscious Modernism.

"For me, Modernism doesn't mean a negation of the past; it just means to live in our time, which always includes previous times and is a continuum. Modernism as a style . . . was, for me, too limiting. But what are we looking at when we speak of Modernism? I see Loos as Modern; I see Mies as Modern; I see Barragán as Modern; Kahn was Modern. To me, their work is about the practice of architecture in a particular time. But Post-Modernism – drawing on a historic vocabulary – even though it says something about the practice of architecture in a particular time, is more selfconsciously about style.

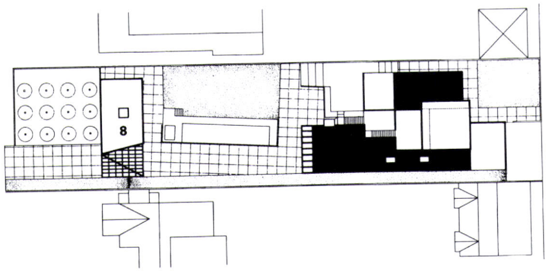
"When I came to this country in 1973, the 'white' Modernism of Meier, Eisenman, and Graves struck me as also very stylistic. It didn't seem very potent to me. Also, after moving to California, I found that the indoor-outdoor relationships, the extension of the house into the out-of-doors, related to the early Modernists. They noted that outdoor spaces were cheaper and that light and air were very important. The Stuttgart Werkbund *Siedlung* was always compared to an Algerian or Tunisian village, which is Mediterranean, like California.



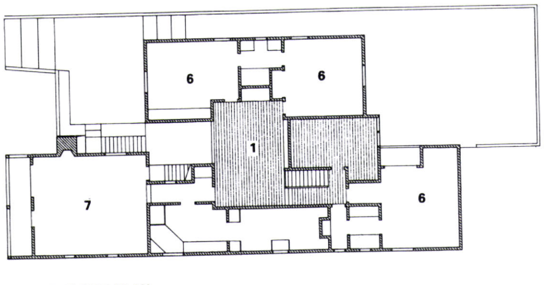
Löcker Verlag, Vienna, 1979.

Moissi House, Venice, 1923 (unbuilt), by Adolf Loos.

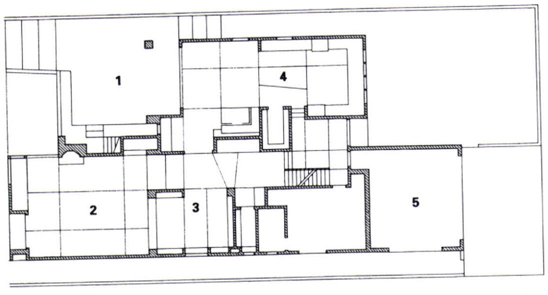
"Loos's Moissi house for the Venice Lido was important for me in the Summers house. I tried for the first time to use his *Raumplan* that has a prescribed exterior and a spatially stacked interior. The rooms have their own proportions – they're differently sized boxes assembled into an envelope."



SITE/ROOF PLAN



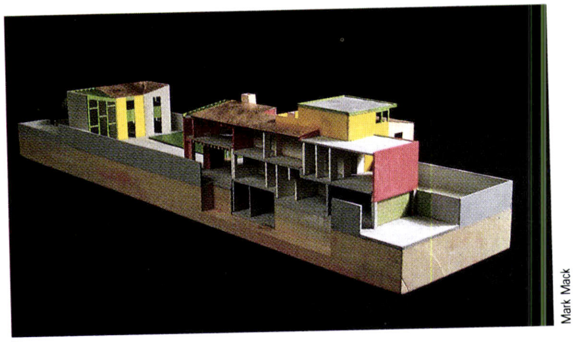
SECOND FLOOR PLAN



FIRST FLOOR PLAN

1 TERRACE
2 LIVING ROOM
3 DINING ROOM
4 KITCHEN
5 GARAGE
6 BEDROOM
7 OPEN TO BELOW
8 DETACHED STUDIO

Mack's adaptation of Loos's Raumplan *is manifest in a cutaway model of the Summers House (3). It is sited near the rear of the lot, where the windows are relatively small and the outdoor space is given over to a child's play area and driveway (4). On the front of the house, the partially screened terrace (5) provides outdoor dining space, with a grill in the fireplace to the right.*



Mark Mack

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4

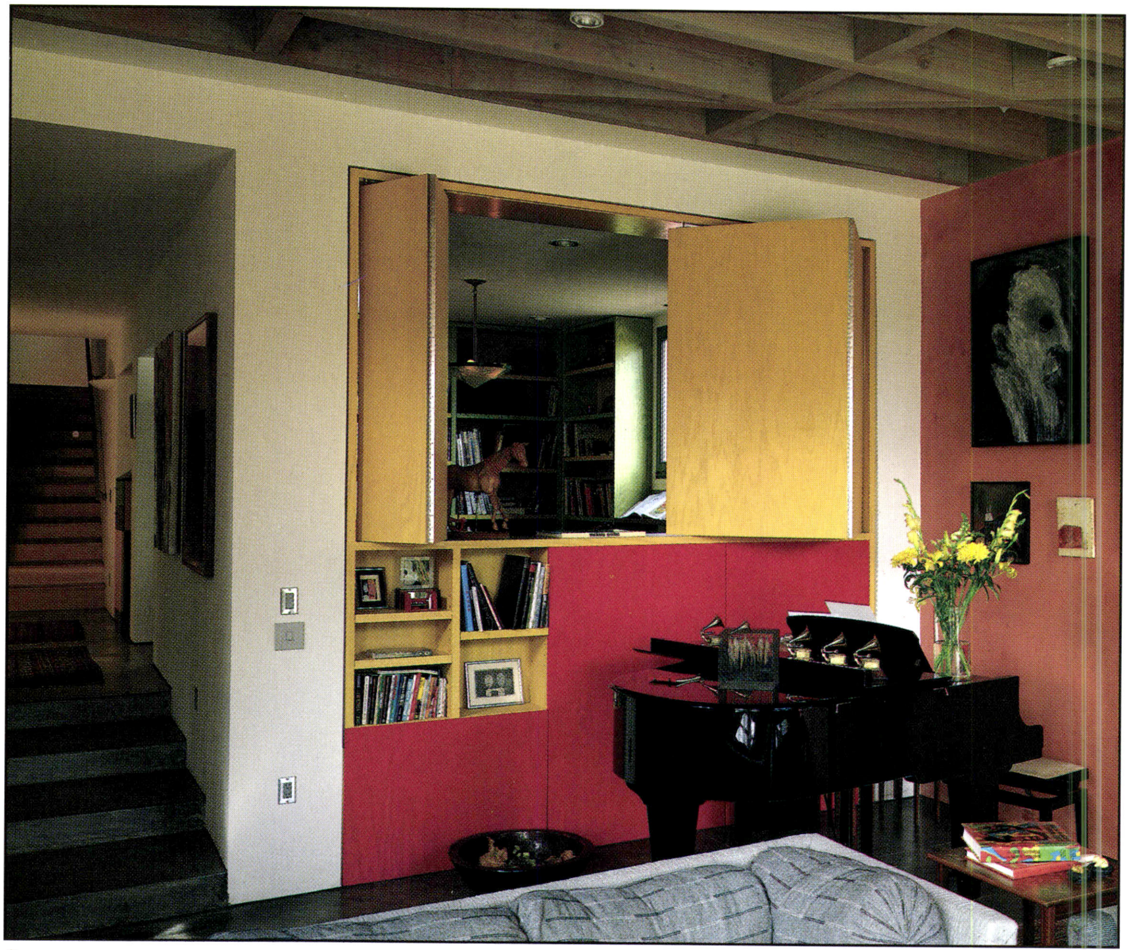
determined: "The envelope – the height, width, and setbacks – resulted from the city codes. The house was set back on the lot as far as permissible to gain sunlight, so the typical relationship between the main house in the front and the auxiliary structure in the back was reversed. This created a new house type on the block and also made a clear separation between public and private space, which is often confused in the usual California context." Kate and Andy Summers wanted many possibilities for being alone or being together as a family, which suggested rooms of distinctly different scales within the envelope. They also wanted a useful basement with light and ventilation, which meant raising it above ground and making the kitchen level higher than the living room level. One thing led to another, and soon Mack found that Adolf Loos's *Raumplan* was a logical model to emulate.

In the *Raumplan*, the vertical dimension of the rooms varies greatly in order to give each a distinct character. Instead of straight paths through the house, the *Raumplan* tends to offer a spiraling circulation route with more than one entry to each room. Levels change frequently; small spaces open up to large spaces through short flights of steps. This spatial drama has a theatrical origin: Loos's experience of sitting in a box at the opera, with its dual condition of intimacy and grandeur, helped inspire the *Raumplan*.

Mack has a distinct way of using wood structural members of different sizes along with integrally colored stucco, materials common to the Mediterranean tradition. He notes that Austria's farmhouses, with colorfully painted plaster walls and exposed timbers, have a clear correspondence between structure and material; they adumbrate the "nailed-together quality" of California buildings. Mack also cites northern Italy's walls of faded colors, cues of the ways the structures changed over time. In a corresponding way, the walls of the Santa Monica house are integrally colored in the muted hues that Mack considers appropriate to the California landscape. Mack's sensibility (if not his palette) harks back to Barragán: "What Barragán did for me was to confirm that Modernism could be based on traditional ways of building and on human sensibilities, rather than on importations of historicist or overtly conceptual language."

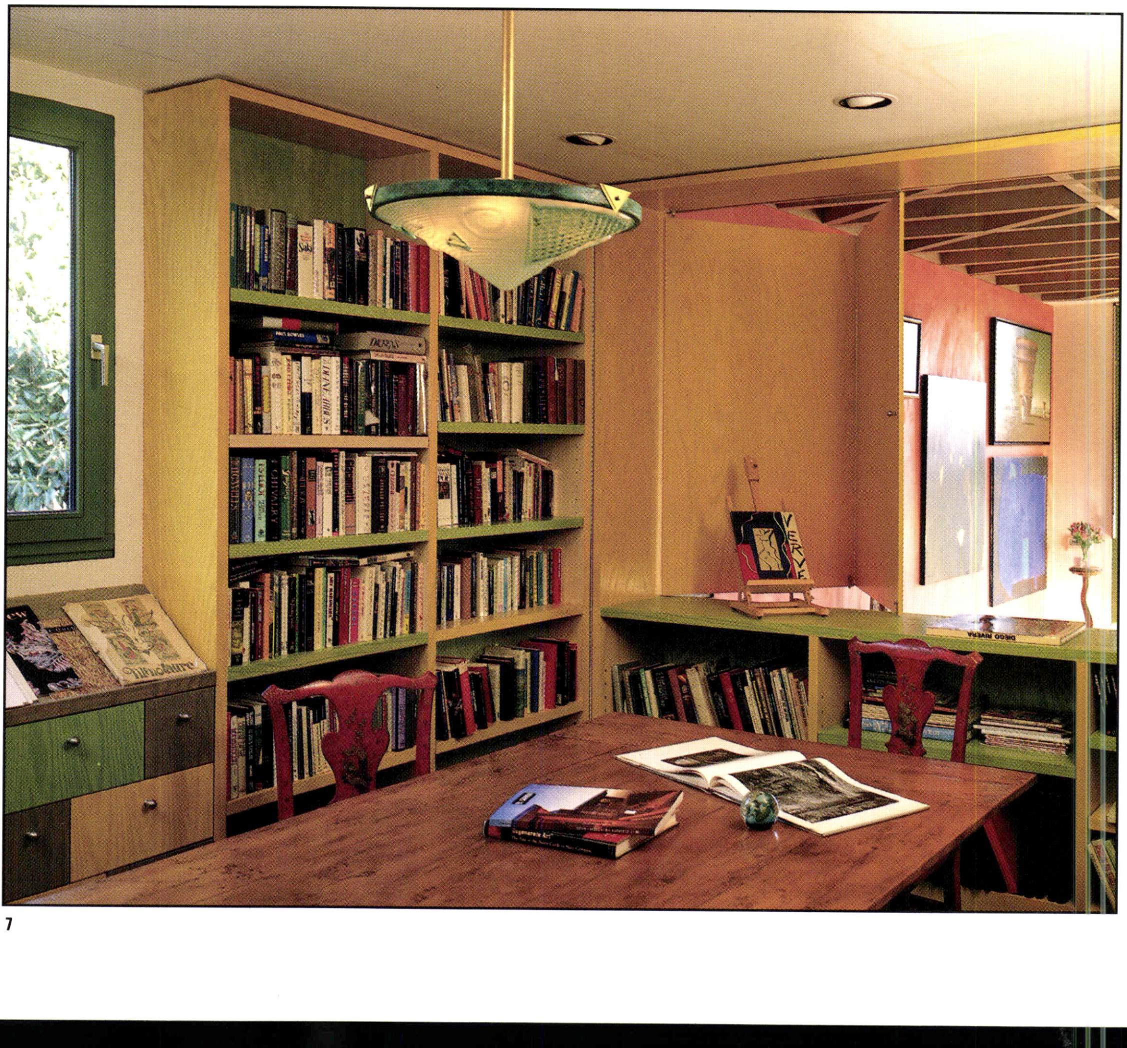
Sally B. Woodbridge ■

The hall that leads from the living room (6) to the dining room (7) leads up the staggered levels of the house. This sectional variety, like the massive walls and coffered ceiling, bespeaks Mack's Loosian sensibilities, rendered in his own palette, attuned to the warm climate of Southern California. The built-in couch and cabinet in the living room (8) provide a setting both intimate and airy; the square window frames a view to the studio at the front of the lot.



6

Project: *Summers Residence, Santa Monica, California.*
Architects: *Mack Architects, San Francisco (Mark Mack, principal; Wooi Cheng Choong, project architect; Janet Cross, Michael Tavel, Ellen Leon, Peter Hierzel, project team).*
Client: *Kate and Andy Summers.*
Site: *a narrow lot in an established residential neighborhood.*
Program: *a 4200-sq-ft single-family residence and a 720-sq-ft pool house.*
Structural system: *wood frame with perimeter wall foundation and slab on grade.*
Major materials: *concrete block, stucco, wood siding, standing metal seam roof (see Building Materials, p. 151).*
Mechanical system: *radiant heating system.*
Consultants: *Nancy Goslee Power & Associates, landscape; Martin Gantman Studio, structural; Warm Floors, mechanical; Comeay Engineers, energy.*
General contractor: *Herman Construction.*
Photos: *Tim Street-Porter.*



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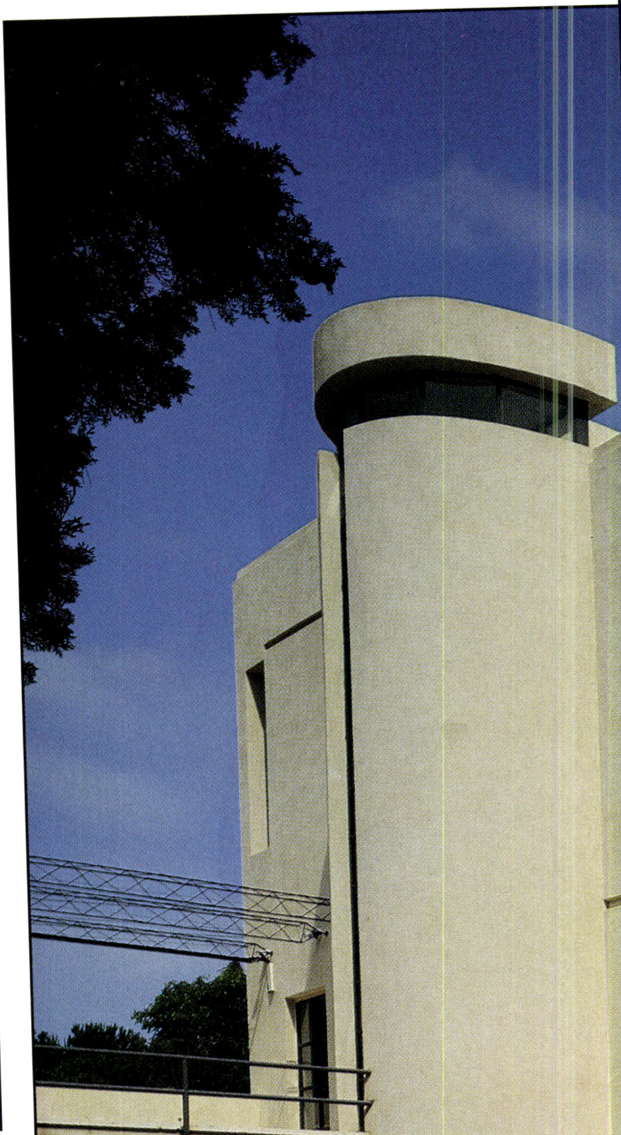
8

The Private and the Public

Ada Karmi-Melamede explores the boundaries between private and public life in this house in Tel Aviv.

1



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The front face of the Kauffman house (1), with its white planar composition and strip windows, refers to early International Style work by architects such as Le Corbusier or Robert Mallet-Stevens. But the stone steps, which bow out into the grassy front courtyard, have a very different pedigree: Michelangelo's stair at the Laurentian Library. The side and rear of the house (2), which face south and east, have a more sculptural, plastic quality that creates deep shadows in the strong Israeli sun. The greater informality of this part of the house also emphasizes its more private functions, with family-oriented rooms overlooking a secluded, tree-shaded garden. Layered in plan, the house is layered in elevation as well, with the east wall wrapping around the living room block and yet separated from it by a continuous skylight.

It doesn't take long before a conversation with the Israeli architect, Ada Karmi-Melamede, turns to the question of public life. Why, she asks, has the public realm declined so rapidly in the West, especially in the U.S.? Why have private interests come to dominate most aspects of our lives? Why are there so few forces or institutions capable of mediating between the two? Such questions recall those asked by the late philosopher, Hannah Arendt, who argued that the ancient idea of public life as the coming together of strangers has been replaced by the modern notion of society, which is structured along the lines of a family, emphasizing closeness or intimacy among people. As private life has become the model for all social interaction, said Arendt, the possibility of living a truly public or private life has become nearly impossible because the two realms have become so blurred. The result has been widespread conformity and mass consumption on one hand, and personal cynicism and political apathy on the other.

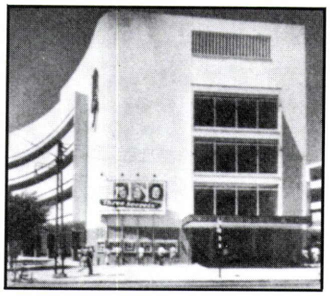
Karmi-Melamede addresses these issues not only in conversation, but in her work, perhap most notably in the Kauffman house, recently completed in Tel Aviv. Her response to the blurring of

Cultural Modernism

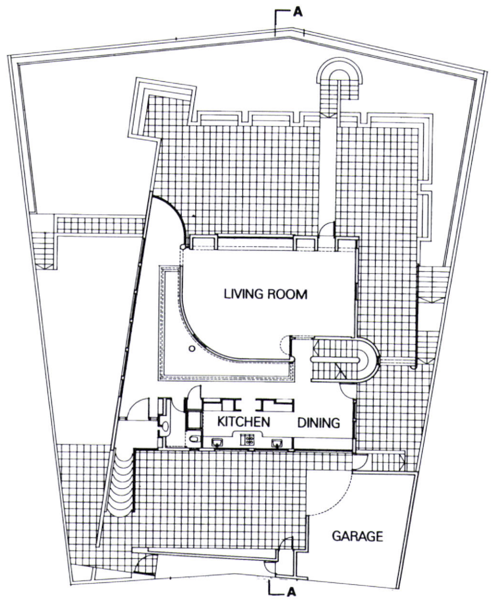
Ada Karmi-Melamede has Modern architecture in her blood. Her father, Dov Karmi, was an architect in Israel who, in the 1930s, designed a number of International Style buildings. And her city, Tel Aviv, "is the largest Bauhaus city in the world," she says. But Israeli Modernism in the 1930s "was not dogmatic," she adds. "It was very civilized, with narrow balconies lining the streets like vertical sidewalks " (see photo). This "circus of balconies," as she puts it, not only shaded the inner, glazed skins of buildings, but provided an intermediate zone along the street that mediated between public and private realms. Such mediating spaces are ever present in Karmi-Melamede's work.

If Israel's version of the International Style has influenced her, so has the expressionism of Eric Mendelsohn. His designs, she notes, "were softer, more personal," and his work is recalled in the sinuous curves that often snake through the rectilinear geometry of Karmi-Melamede's buildings. Finally, there is the presence of Louis Kahn in her architecture, in its simple tectonic quality, in its exploitation of natural light, and in its layering of walls or buildings within buildings.

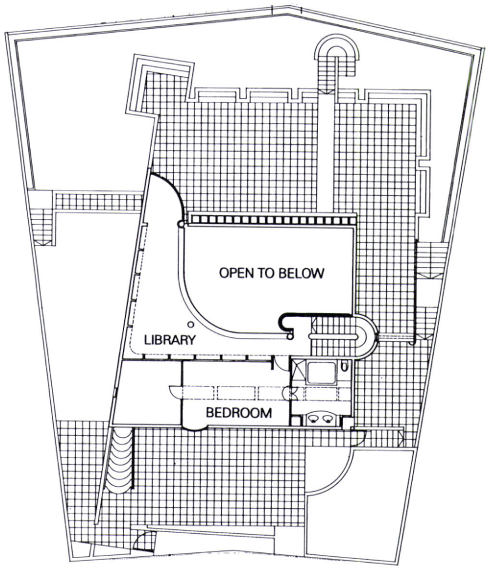
It has become common to think of artistic influence as a very selfconscious, and anxiety-producing activity. But Ada Karmi-Melamede shows that such influence can also be very unselfconscious, that it can be part of the very air we breathe and the family we're born into. She is a Modernist, in part because she cannot be any other way.



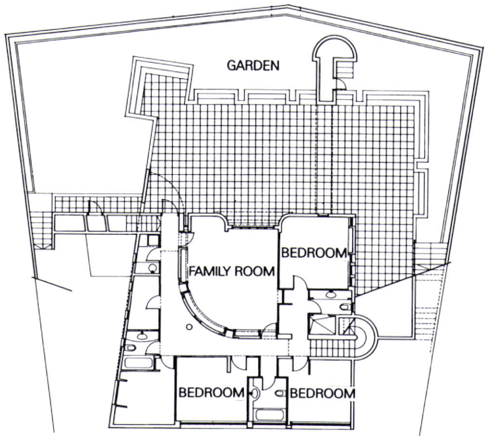
Arieh Sharon's Hen Cinema in Tel Aviv, 1940s.



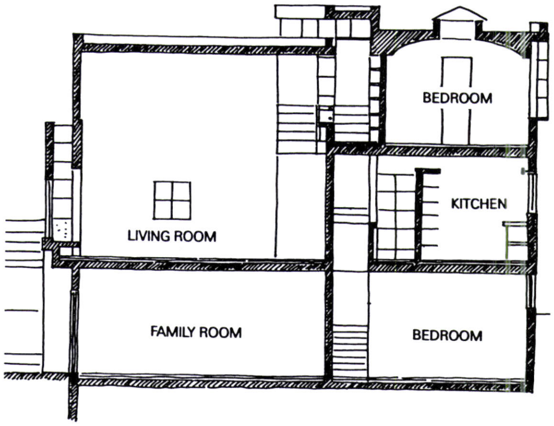
FIRST FLOOR PLAN



SECOND FLOOR PLAN



GROUND FLOOR PLAN



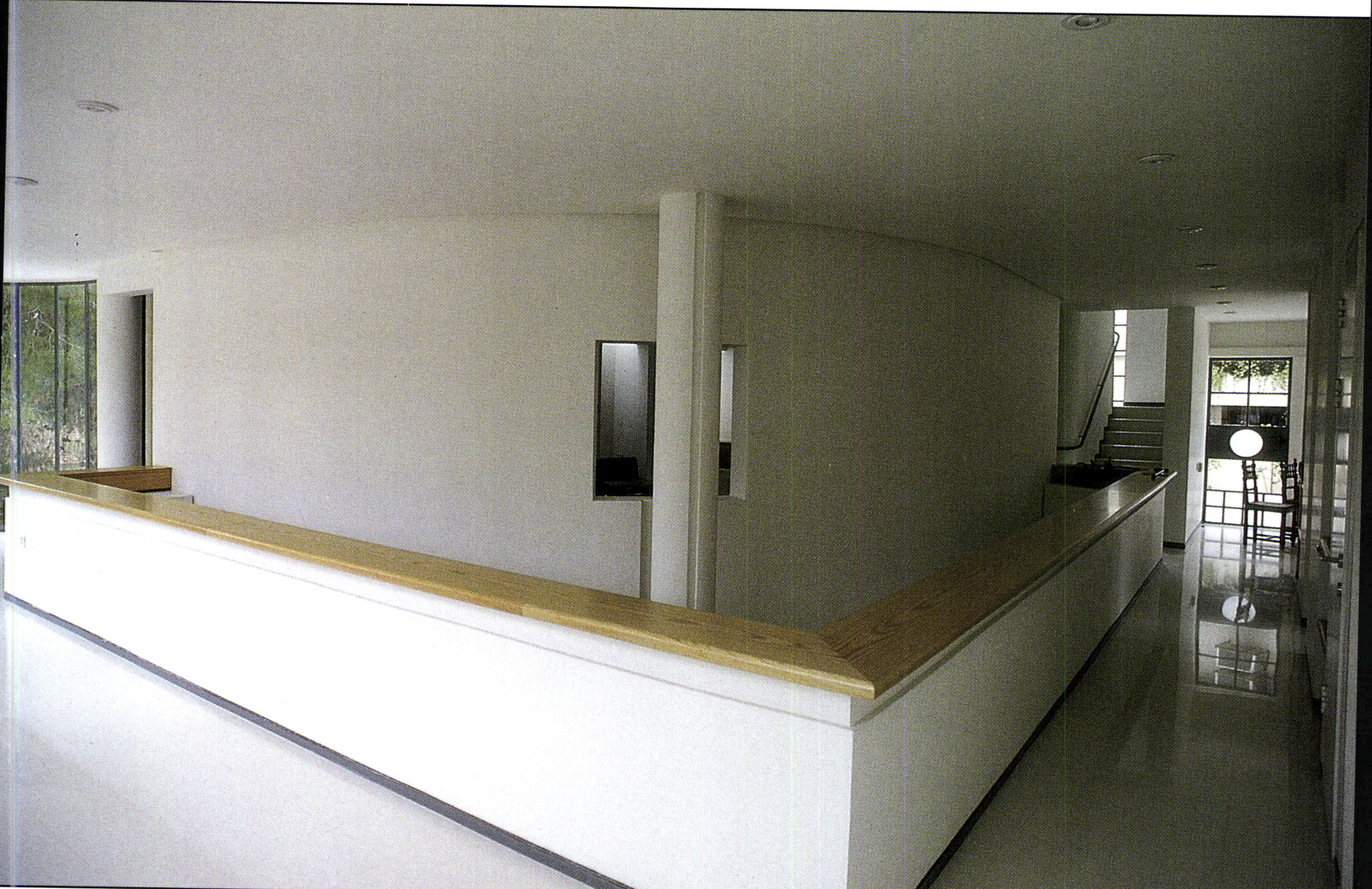
SECTION AA

public and private life has been to clarify the distinctions between those two realms while avoiding a simple dichotomy through the creation of finer gradations of public, semi-public, semi-private, and private space. For example, she has encircled the Kauffman house site with a wall. Although not a complete visual screen, the wall does differentiate public and private outdoor space.

That wall also marks the edge of a series of increasingly private zones in the house. For example, just inside the wall and accessible via a gate or the garage is a minimally planted "plaza," which provides a forecourt to the house. The semi-public nature of this space is emphasized by cascading stone steps that curve and widen at the bottom, as if to accept large numbers of people. These steps lead to the entrance half a floor up and, beyond that, to a semi-private, two-story zone of circulation that wraps, like an internal street, around the curved freestanding "façade" of the corner living room and library block. This "street" provides access to the most private parts of the house. In one direction, via a walkway that opens out to views of trees, lies the living room; in the other direction, a switchback stair leads to bedrooms on the first and third floors.

Karmi-Melamede recognizes that the in-between spaces in any house, as in any city, are often the most important, and so she lavishes considerable attention on them here. For example, she widens the circulation street along its length and marks the midpoint with a single round column, as if to pin down an inpromptu gathering place for family members. Another in-between place is the thick wall in the living room, whose built-in seating and skylights provide a more private location within the house's main space.

It may seem odd to talk about a private house in relation to the reconstruction of public life, but there is a good reason for it. The typical house, because of television, has become the new public place, where we see events and strangers and gather news and information. As a result, making distinctions between public and private space has become as important in the house as it has always been in the city. Hannah Arendt once wrote that "the public realm. . . gathers us together and yet prevents us from falling over each other." That describes quite well the achievement of the Kauffman house. **Thomas Fisher** ■



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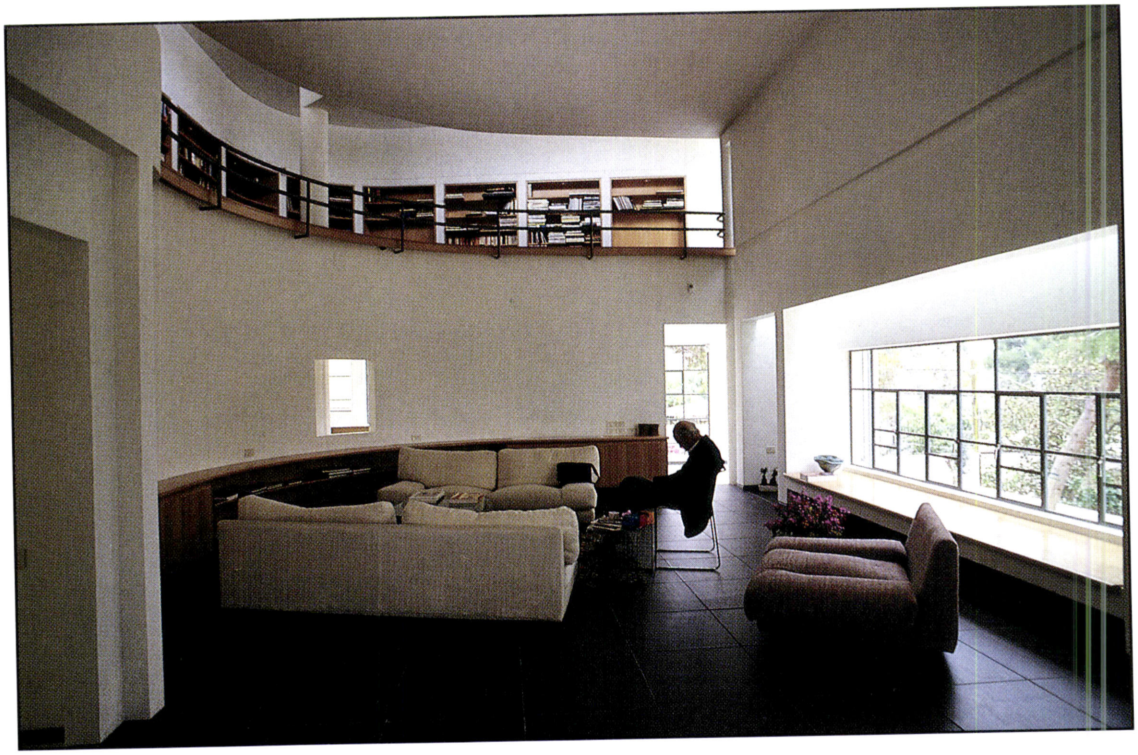
Peter Szmuk

Within the fairly simple cubic form of the house is a complex plan and section, with blocks of rooms separated by interstitial zones that serve mainly as circulation space and lightwells (see plans and section, facing page). The main in-between zone lies inside the front door, where a double-story L-shaped corridor wraps around the corner living room block (3). The center of the curved living room wall is marked by a round column and an interior "window," reinforcing its role as a kind of façade overlooking this interior "street." One leg of the corridor leads to the living room past a series of stepped windows that overlook a side courtyard (4). The other leg leads to a stair that provides access to the first floor bedrooms and the third floor library and bedroom (5).

6

Project: *Kauffman house, Tel Aviv, Israel.*
Architects: *Karmi Architects, Tel Aviv. (Ada Karmi-Melamede, partner; Haim Leshem, project architect; Tal Gazit, architect).*
Client: *the Kauffman family.*
Site: *steep, sloping, 7000-sq-ft site.*
Program: *a 4000-sq-ft house.*
Structural system: *reinforced concrete.*
Major materials: *stucco, steel windows, stone paving, marble flooring.*
Consultants: *Eitan Shaya, civil; Shapira/Hahn, mechanical; Galmor, plumbing; Ben Horin, electrical; Nahum Yuval, coordination and supervision.*
Costs: *not available.*
Photos: *Marvin Rand, except as noted.*

The living room/library is lighted, in part, by a clerestory (6) and by windows and skylights in a thick, layered wall (7).

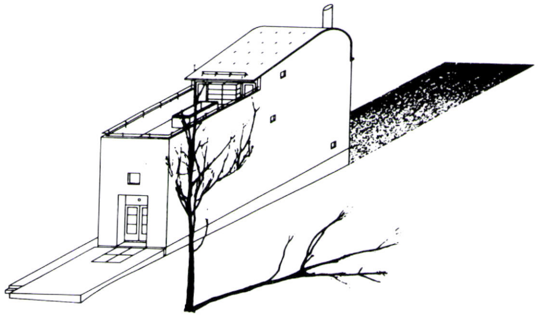


7

The House as Social Critique

Canadian architect Steven Fong uses Modernist precedents

to question ideas of domesticity.



1

With its linear form and nearly blank side walls, this speculative house addresses the typical conditions of residential neighborhoods in Toronto, with their freestanding structures on narrow lots (axonometric, above). With private open space at a premium in this city, the glazed loft space and roofdeck of the house take advantage of the most secluded outdoor space available (1). The prototypical aspect of the house, with its few multi-use spaces, challenges the idea that affordable housing must be cramped or simply a smaller version of more expensive residences. This house suggests that, in the name of affordability, we can begin to explore alternative ways of living, a particularly important message in Canada, where housing innovation is discouraged by tax laws that do not allow mortgage write-offs and thus put a premium on resale value.

Architects have often been accused of designing every house as if for themselves. But there are times when such a practice is justified, as in this low-cost, speculative studio-house by Toronto architect Steven Fong. Winner of a P/A Award (P/A, Jan. 87, p. 94), the house seems tailor-made for an architect or artist. It features two double-height spaces, staggered in section, that can serve as living, working, or sleeping areas. The house also has a wet core with the kitchen on the first floor and a bath on the second, and a cascade of stairs along the side wall that leads to a third-floor loft and rooftop terrace.

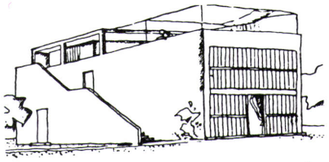
Although clearly influenced by the work of Le Corbusier (see sidebar), Fong seems mainly interested in the social critique implicit in Modern architecture. Echoing Heidegger, Fong writes: "The architecture of dwelling must reclaim poetry as its basis to combat the increasing alienation of urban inhabitants from the natural world. Architecture must return to pre-functional, pre-ideological space whose essence reveals the infinite and eternal dimensions of human existence." This house, continues Fong, "re-introduces to current discussions on low-cost housing the sub-cultural theme of an artist's studio-house. . . It alludes to a life involving both cultural 'citizenship' and heightened individual awareness."

Modernism, in other words, represents for Fong, as it did for Le Corbusier, a new way of living in the world. That has often included a spatial and temporal integration of work and home life, a physical and psychological openness within families, and a reduced dependence upon material goods. This studio-house is really a prototype for such a life. Its two double-height, multipurpose spaces allow living and working to occur almost interchangeably; its lack of interior doors (there is one for the bathroom) provides for familial openness; and its lack of closets (most storage is in movable storage units designed by Fong) discourages the accumulation of possessions.

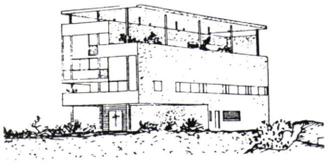
This Modernist vision has come under severe criticism in recent decades as being completely foreign to the way most people live. The current owners of this house seem to bear witness to that charge. Although the low cost of the house appealed to them, when they became parents they had to move the master bedroom to the loft (replacing the spiral with a code-complying stair),

A Social Modernism

Steven Fong drew from a number of Modernist sources in the design of this house. The staggered, double-story spaces recall those in Le Corbusier's first Carthage project of 1928, and the house's nearly blank side walls, side entrance, double-story front room, cascading stairs, and rooftop terrace are reminiscent of Corb's low-cost Citrohan house of 1922. Le Corbusier was not the only influence, though. Fong looked at James Stirling's work, with "its small size and large scale," and at some of Frank Gehry's buildings, with "their intention of being added to and changed." Finally, like many Modern architects before him, Fong was inspired by vernacular industrial construction. The curved, corrugated metal roof at the back of the house uses the same material "as Manitoba grain hoppers," and the gussets under that curved roof are similar to those that Howard Hughes used in his plane, the *Spruce Goose*. Fong may look to other Modern architecture for ideas, but he is no historicist. His work refers to Modernism, not as a style or an aesthetic, but as a way of approaching various social and abstract formal problems. "The architecture of the house," writes Fong, "(is) about its spatial configuration and the incidence of natural light."

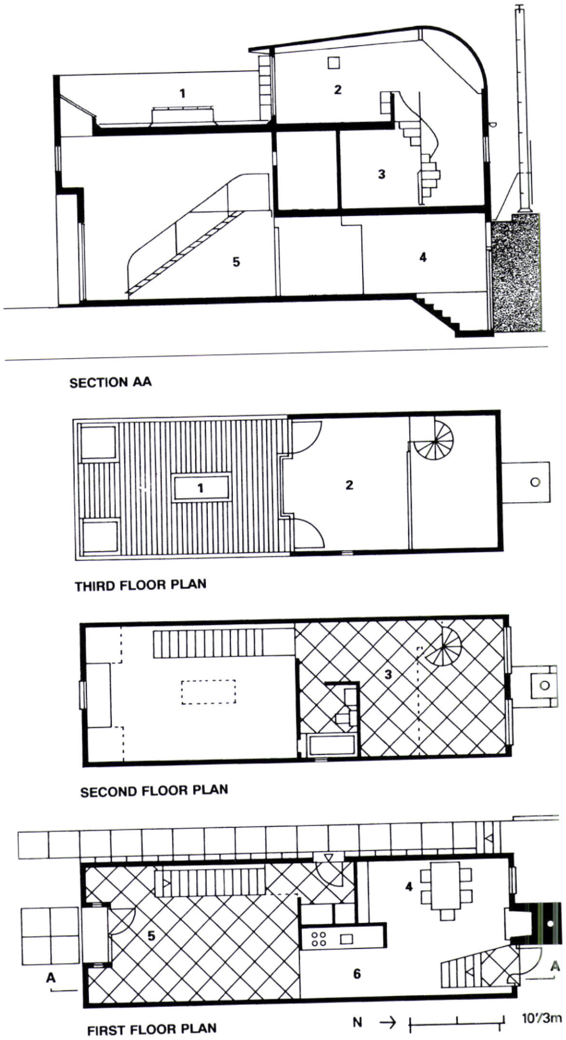


Le Corbusier's Citrohan house of 1922.



Le Corbusier's first Carthage project of 1928.

2



1 DECK
2 LOFT
3 SLEEPING
4 DINING
5 LIVING/WORKING
6 KITCHEN

clip panels to the rail to protect the child from falling through the open stair, and accommodate, with temporary racks and shelves, the exponential growth of children's clothing and toys. Those changes, plus the leaking skylights and noisy heater in the living room, would dampen the spirits of even the most determined Modernist.

Still, the ideas behind the house remain valid, even if the house itself is not right for every family at every point in their lives. As Fong correctly observes, "The studio-house. . . has historically been a critique of bourgeois society." In an era when residential architecture has, all too often, become a matter of catering to the tastes and fancies of the well-to-do, the profession needs reminding of its tradition of social criticism. Architecture is, as Steven Fong might say, foremost an act of "cultural citizenship." **Thomas Fisher** ■

3

4

The façade of the house (2) has a ceremonial entrance whose large scale acknowledges its public face, while countering the small size of the structure. Inside, the double-height rooms have a Spartan quality (4), reflecting an intention that they be generic spaces, capable of multiple purposes and alteration over time. In true Modernist fashion, the idea of generic space goes in two very different directions. One one hand, the space itself seems continuous and part of a larger whole, with corner skylights and corridors that allow walls to slip past each other. On the other hand, there are objects in the space, such as the hanging industrial heater and the stair made of steel tubes the size of bicycle handlebars (3), that are utilitarian in origin or that refer to mass-produced commodities.

Project: *Studio Prototype House, Toronto, Canada.*

Architect: *Steven Fong, Toronto (Steven Fong, principal-in-charge, with Andrew Jones, Leslie Endes, Ted Footman, Kent Aggus).*

Client: *speculative house now owned by Laura Holmes.*

Site: *typical mid-block Toronto lot with an 18-ft frontage and 100-ft depth in an older residential area.*

Program: *space for working, living, eating, sleeping, and study, plus a kitchen, bathroom, and roof deck, all in 1526 sq ft.*

Structural system: *2x6 wood framing on CMU foundation and spread footings.*

Major materials: *epoxy stucco on EPS, wood flooring, steel railing (see Building Materials, p. 151.)*

Mechanical system: *electric industrial unit heaters with supplementary electric baseboard heating.*

Consultants: *M.S. Yolles & Partners, structural.*

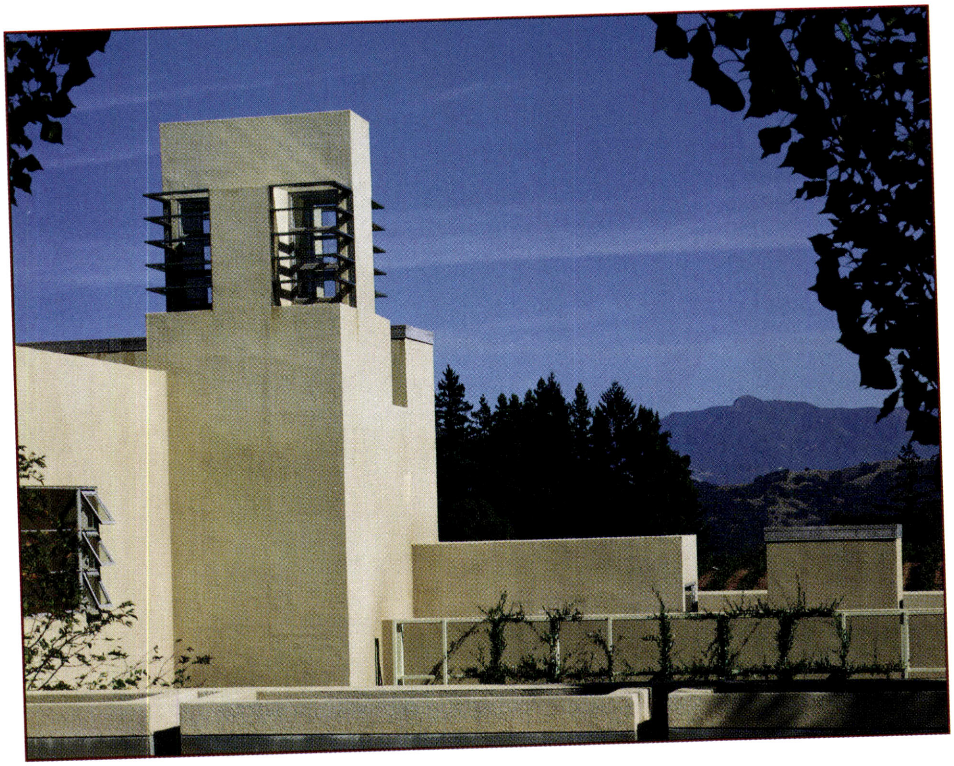
General contractor: *A.C.E. Buildings Contractors, Steve Bugler, Contractor.*

Costs: *$102,000 (US), $65 per sq ft (US).*

Photos: *Robert Burley/Design Archive.*

A Gentle Machine in the Vineyard

A weekend house by Jennings & Stout employs
a Modern aesthetic softened by the influence of the land.



1

The Schreyer House stretches across a hillside to provide most rooms with views of the client's vineyard (2). The house turns its back to the west, partly because of the harsh afternoon sun but also to screen out the view of a neighbor's property. The entry is sheltered from this view by a walled drive, two rows of Italian poplar trees, and an auto court (3). A stair tower (1) marks the entrance and the point where the house's two axes cross.

2

The Modern architect's ideal, seen in such works as Mies's Farnsworth House and Le Corbusier's Villa Savoye, is that of a diamond in the rough, a crisp, man-made presence dropped into a natural landscape. But in the Schreyer House by Jim Jennings and William Stout, the contrast between house and site is less precise. Although the house employs the insistent rectilinear geometry and abstract language of Modernism, its plan, siting, and colors owe much to the surrounding landscape. And although that landscape is one of picturesque rolling hills, its vineyards display the same sharp geometry found in the house.

The house sits atop a hill overlooking the client's vineyard and the nearby town of Healdsburg, California, about 70 miles north of San Francisco in Sonoma County. The architects and the clients, San Francisco residents Gary and Chara Schreyer, chose this particular spot on the 60 acres because of the view. Two existing natural features of the site – a pair of olive trees and a grove of red-barked madrone trees – mark the ends of the house. The major rooms are oriented to the vineyard, stretched along a spine that shifts slightly at the entrance: To the left is a view of the madrones, to the right, a view of the olives.

Jennings & Stout enhanced the remarkable view of the vineyard – laid out in rows perpendicular to the house – by manipulating the plan to provide corner windows for the rooms facing the vineyard. These custom-made steel windows, divided into long horizontal panes, emphasize the horizontality of the vineyard and the 180-degree view. The architects took special advantage of this window detail at the center of the house, where the volumes step back in sawtooth fashion to create a sheltered patio for the swimming pool.

The emphasis on rectilinear geometry in the house is the product not only of Jennings & Stout's predisposition, but also of the clients' interest in Modern art. Gary Schreyer's passion for Mondrian influenced details like the stairs, and his interest in Kandinsky led to the design (by interior designer Gary Hutton) of the terrazzo floor that stretches the length of the main level. But the earthy colors that temper the house's man-made qualities are the result of another hand: that of color and materials consultant James Goodman. While the architects felt that the house should be painted white or gray, and that the interior floor should be

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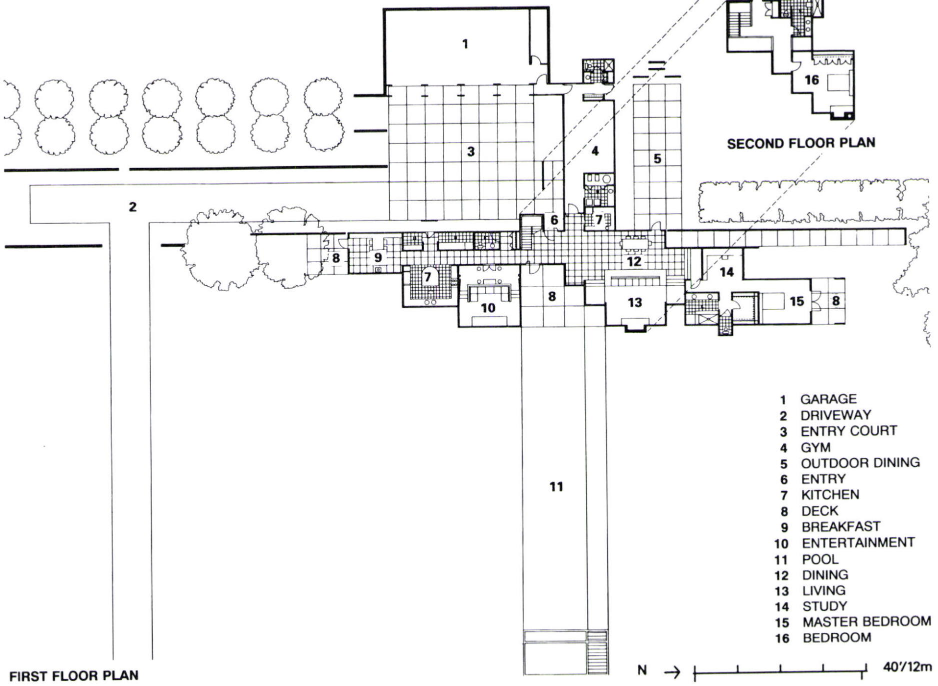


1	GARAGE
2	DRIVEWAY
3	ENTRY COURT
4	GYM
5	OUTDOOR DINING
6	ENTRY
7	KITCHEN
8	DECK
9	BREAKFAST
10	ENTERTAINMENT
11	POOL
12	DINING
13	LIVING
14	STUDY
15	MASTER BEDROOM
16	BEDROOM

4

a neutral color, Goodman believed that the house's linearity created "sufficient contrast with the site" and that using natural colors – as opposed to Modern neutrals and primaries – would "bring it back into harmony with nature." Goodman found the colors for the stucco walls (a sagelike green-gray) and the terrazzo floor in the soils and plants of the site.

Goodman's interventions made the design a less pure descendant of the Bauhaus Modernism that inspired it, but in this case that is fortunate. The rich colors of the terrazzo and stucco enhance the house's dialogue with the site, and the architectural ideas – for the most part – hold their own.

William Stout does feel that some of the clarity of his original concept was compromised during the design process: "It was supposed to be a series of planes, with the walls reaching out to the landscape and, as it got to the center, building up into a more volumetric piece of architecture." That idea, which shows up clearly in the plan, is somewhat obscured in the built work; there is a not unpleasant ambiguity, abetted by the emphasis on corners, as to what is a planar wall and what is a volume.

There was a great deal of negotiation among the architects, clients, and consultants of this house. Instead of watering down the architecture, though, the push and pull has strengthened it, yielding an unquestionably Modern house unquestionably wedded to its landscape.

Mark Alden Branch

The two-story central portion of the house (4) contains children's bedrooms upstairs. A long pool defines the house's secondary axis. The terrazzo floor in the main living area (5), based on Kandinsky motifs admired by the Schreyers, was designed by interior designer Gary Hutton. The window at left looks onto an ornamental pool and beyond to a grove of madrone trees.

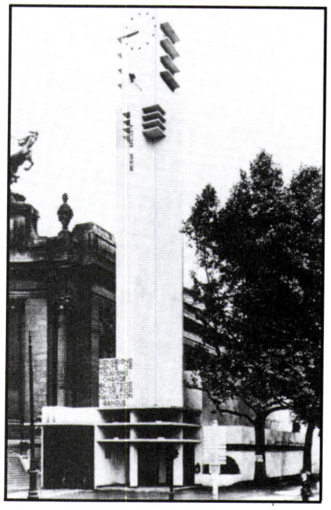
5

Two Views on the Modern

Jim Jennings and William Stout, who have dissolved their partnership since this house was designed, have differing attitudes about Modernism, according to Jennings: "Bill's work seems to be very connected to the stylistic elements of Modernism, while mine involves connecting with abstract and noncultural ideas."

Since the Schreyer House was conceived more by Stout than by Jennings, it is not surprising that references to past Modernism can be found throughout. Stout says he has a "generalist attitude" toward the Modernist canon, and mentions resemblances in this house to the work of Mies (the use of linear walls to define space), Wright (the cross-axial plan and window details), and Neutra (the play of indoor and outdoor space), but also says that the house wasn't influenced "by any one of them in particular."

Jennings, too, points out similarities to the work of past architects, including the French architect Robert Mallet-Stevens (1886–1945), whose work included the Tourism Pavilion for the 1925 Paris Art Deco exhibition (see photo). The stair tower of the Schreyer House especially recalls Stevens's Moderne vocabulary. But for Jennings, "the idea underlying the whole project is the connection with the site through geometry," an idea that has less to do with Modern style than with the movement's emphasis on geometry as a determinant of form.



Tourism pavilion, Art Deco exhibition, by Robert Mallet-Stevens.

To the right of the entry is another corridor that looks to a pair of olive trees that, with the madrone grove, determined the siting of the house (6). The steel stair insistently continues the rectilinear character of the house. The dining table was designed by Jennings. The house features several fine outdoor spaces, including a dining patio off the living area (7) surrounded by fruit trees. The patio and indoor dining area are served by a secondary kitchen nearby. The steel windows facing the vineyard (8, 9) feature mullionless corners to enhance the 180-degree view. The master bedroom (9) has its own porch overlooking the madrone trees and a Mondrian-like storage wall behind the bed.

6

Project: *Schreyer House, Healdsburg, California.*
Architects: *Jennings & Stout Architects, San Francisco.*
Clients: *Gary and Chara Schreyer.*
Site: *60-acre tract of rolling hills with native oak and madrone trees and vineyards.*
Program: *4000-sq-ft three-bedroom weekend house.*
Structural system: *wood frame on concrete foundation.*
Major materials: *cement plaster exterior walls, steel windows and doors, concrete and terrazzo floors, plaster interior walls (see Building Materials, p. 151).*
Mechanical system: *heat pump.*
Consultants: *Ed Haag, landscape; Gary Hutton, interiors; Dominic Chu, structural; James Goodman, materials and colors; Chris Wilhelmsen, steel.*
Contractor: *Werner Schneider.*
Costs: *withheld at owner's request.*
Photos: *Mark Darley/Esto.*

7

8

9

Four in a Row

A house of eccentric pavilions by Australian architect Dale Jones-Evans challenges the domestic proprieties of suburbia.

1

A steel structure links the Gallery House's four pavilions, interspersed with courtyards and mature trees. Each bay is part of an ensemble layered from the street to a garage/studio adjacent to an alley in back. The kitchen bay, finished in white stucco (1), is seen here from the studio. The glazed second-floor bridge to the left of the kitchen leads to a semicircular bedroom (2), clad in zinc shingles and set above the garage.

Set in a typical suburban block outside Melbourne, the Gallery House is a levitating image of white masonry and reptilian shingles. Provocative cantilevers and pristine materials give it the aura of the new Modern house in the neighborhood, sandwiched between a row of 19th-Century Victorian houses and a more recent (and undistinguished) apartment building.

In a discussion on this house, Jones-Evans noted that "all other issues aside, architecture, like painting, is an optic proposition." This view has limited currency today, when seeing the intentions embodied in the architectural object, rather than seeing the object itself, is the preferred mode of observing architecture. Most histories of Modernism have promoted the house as a reforming social instrument or as a machine that embodies a critical objective. But there may also be a neglected history of this building type, a line of inquiry that relates to the more purely sensory quality of the Modern house. We don't often speak or write about the visual prettiness of Neutra's country houses or the sensual imagery of Le Corbusier. But Jones-Evans has always been interested in working with the visual aspects of architecture. He was trained as a painter and sculptor before he studied architecture and co-founded Biltmoderne, whose innovative furniture has previously appeared in this magazine (P/A Sep. 1987, p. 148).

Finding useful correspondences between painting and architecture has been problematic in the Modern era: All too often, it occurs in a merely graphic way, as in plans that look like Malevich's Suprematist compositions or windows divided in formats that evoke Mondrian. However, the principal quality in painting that transfers to architecture may instead be a concern for the surface of things. "Painterly" adjectives are woven into Jones-Evans's descriptions of the Gallery House: He speaks about surfaces of bare materials, anchored and floating elements, and architecture that is both a visual and a contemplative spectacle.

Jones-Evans describes the Gallery House with references to the landscape and the city. One of our most memorable images of the Modern house is the pure white cube (the machine) floating over the landscape (nature), a duality of two polarized elements. In Australia this contrast is not a dialectical strategy of the architect, but rather a natural condition. We live in a landscape

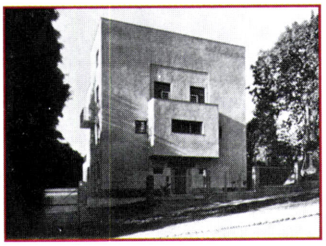
An axially symmetrical front court is visible from the living room and

Modernism for an Island Nation

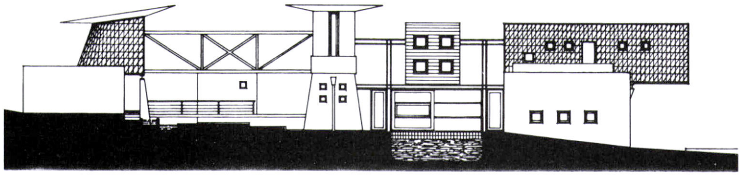
Jones-Evans's Gallery House derives much of its language from the Modernist tradition. The front elevation contains some of the formal precision of Adolf Loos's Moller House; the glazed steel bridge may be derivative of the Charles and Ray Eames House; and the handrails have the nautical character of those on ocean liners habitually praised by Modern architects.

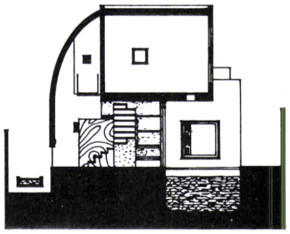
But these citations are not explicit references, for the sources themselves exist primarily as images. Their photographic renditions have assumed greater visual importance than the original works of architecture themselves. As such, the references are not quotations but a type of superficial notation. The classical Modernist aesthetic of pipe handrails, fine horizontal glazing bars, and white surfaces really represents just bits of image – decorative marks on the surface without the intrinsic value of their original sources.

This quality is of particular relevance in Australia because the influence of the Modernist tradition has often come to us from transitional sources rather than from original ones. For instance, the California Modernist houses of Neutra and Schindler were more directly influential here than were their European precursors by Le Corbusier and Gropius. Similarly, the work of Frank Lloyd Wright's followers on the West Coast was more influential than Wright's Midwestern work. This creates a second-hand aesthetic in Australia. It also gives architects the freedom to use Modernist imagery to create beautiful architectural scenes that are primarily picturesque instead of ideological.


Locker Verlag, Vienna, 1979.

Moller House by Adolf Loos, Vienna, 1928.


ELEVATION/SITE SECTION ALONG EAST-WEST AXIS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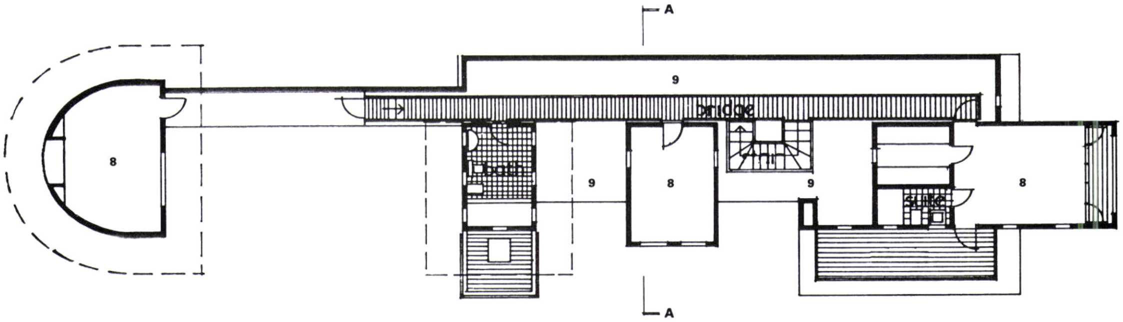
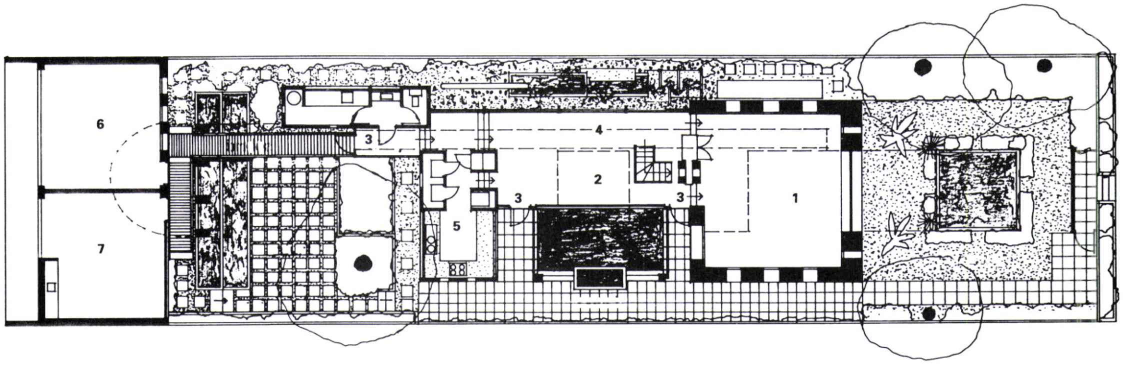


SECOND FLOOR PLAN



FIRST FLOOR PLAN

1 LIVING
2 DINING
3 ENTRY
4 GALLERY
5 KITCHEN
6 GARAGE
7 STUDIO
8 BEDROOM
9 OPEN TO BELOW

Modernism for an Island Nation

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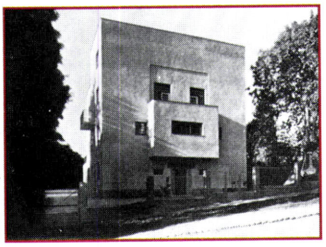
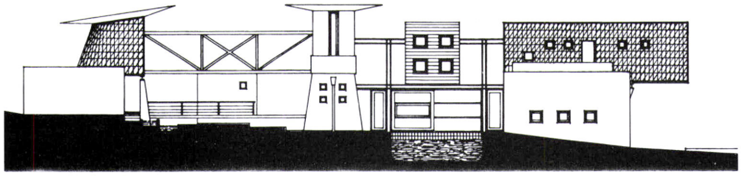
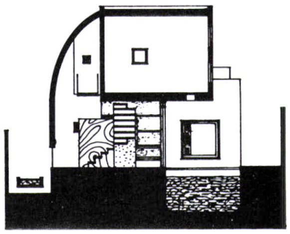

Löcker Verlag, Vienna, 1979.

Moller House by Adolf Loos, Vienna, 1928.


ELEVATION/SITE SECTION ALONG EAST-WEST AXIS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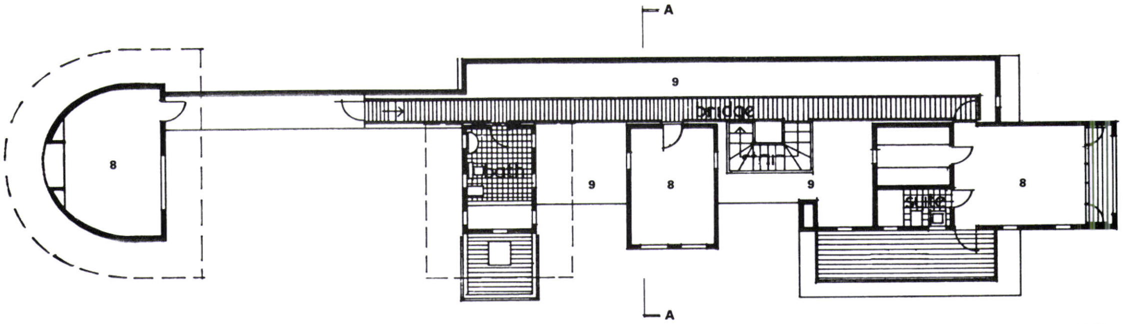
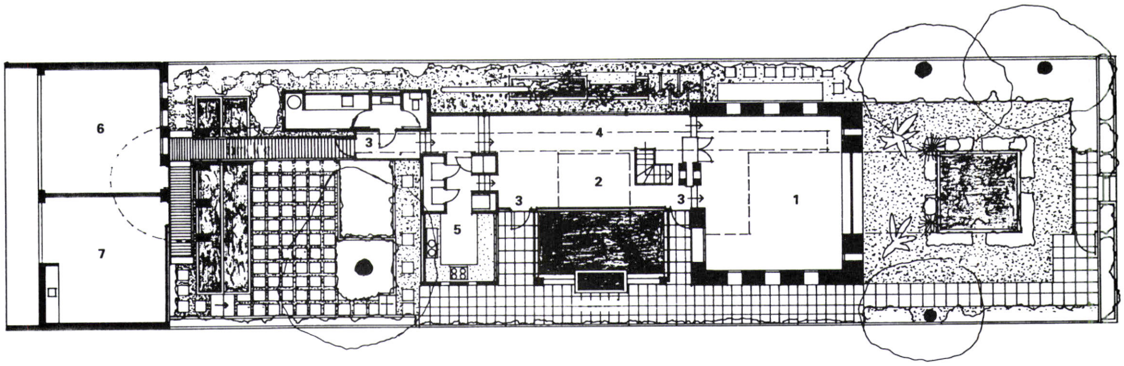

SECOND FLOOR PLAN


FIRST FLOOR PLAN

1 LIVING
2 DINING
3 ENTRY
4 GALLERY
5 KITCHEN
6 GARAGE
7 STUDIO
8 BEDROOM
9 OPEN TO BELOW


3


4

5

An axially symmetrical front court is visible from the living room and the cantilevered bedroom (3). One enters the house from the court in the middle of the lot (4), through paired doors that flank a small pool. Inside, light filters through a double-height gallery to the four-square living room (5). Strategically placed windows open the interior to the courtyards; they maximize privacy as well as the sunlight that filters through the large trees. The curved wall of the windowless gallery (6) wraps over the bridge, an open walkway flanked by the second-floor bedrooms and bathrooms.

6

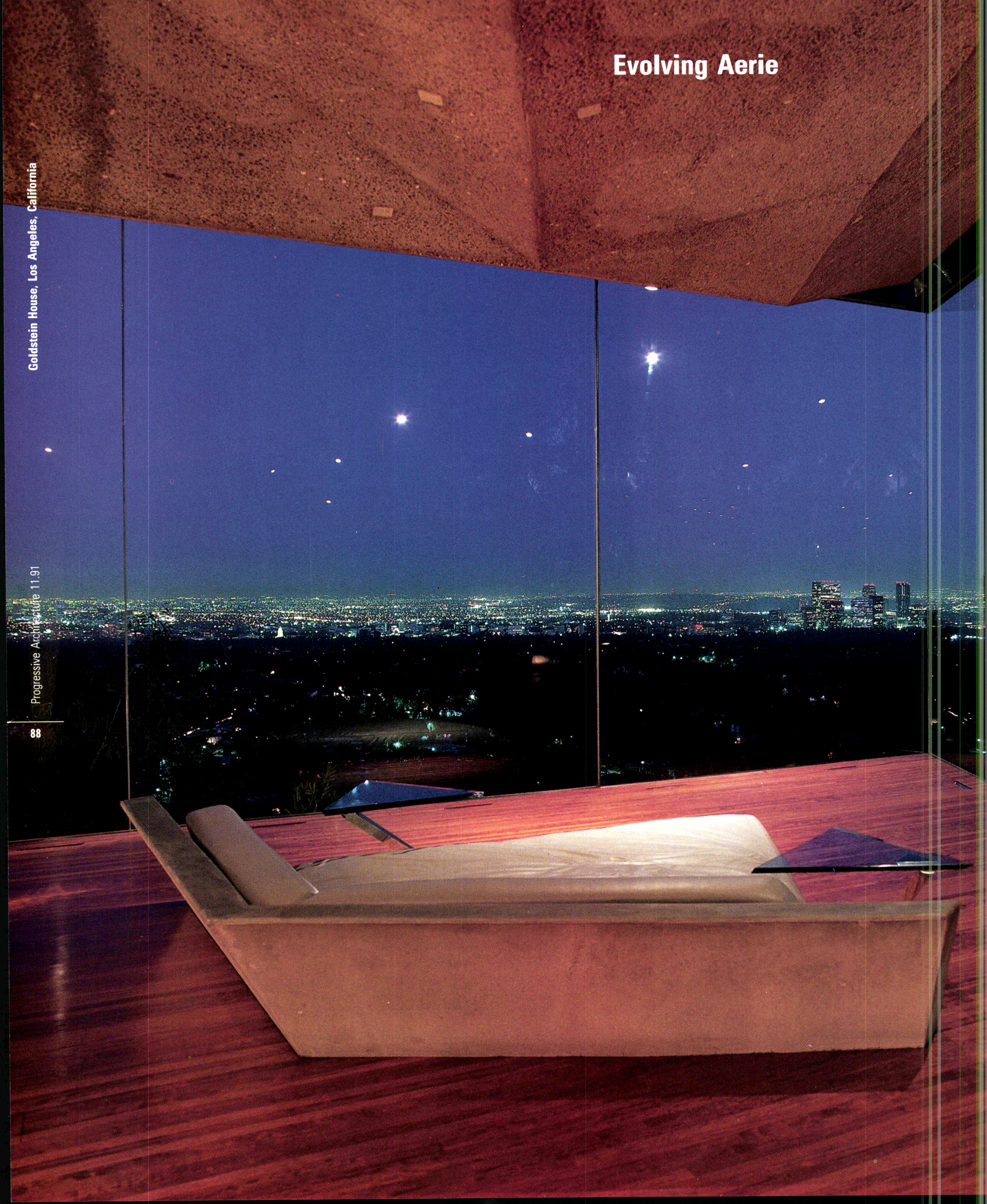
of raw juxtapositions rather than picturesque compositions. The Gallery House is like an object in such a landscape, adapted to the constraints of the suburban block.

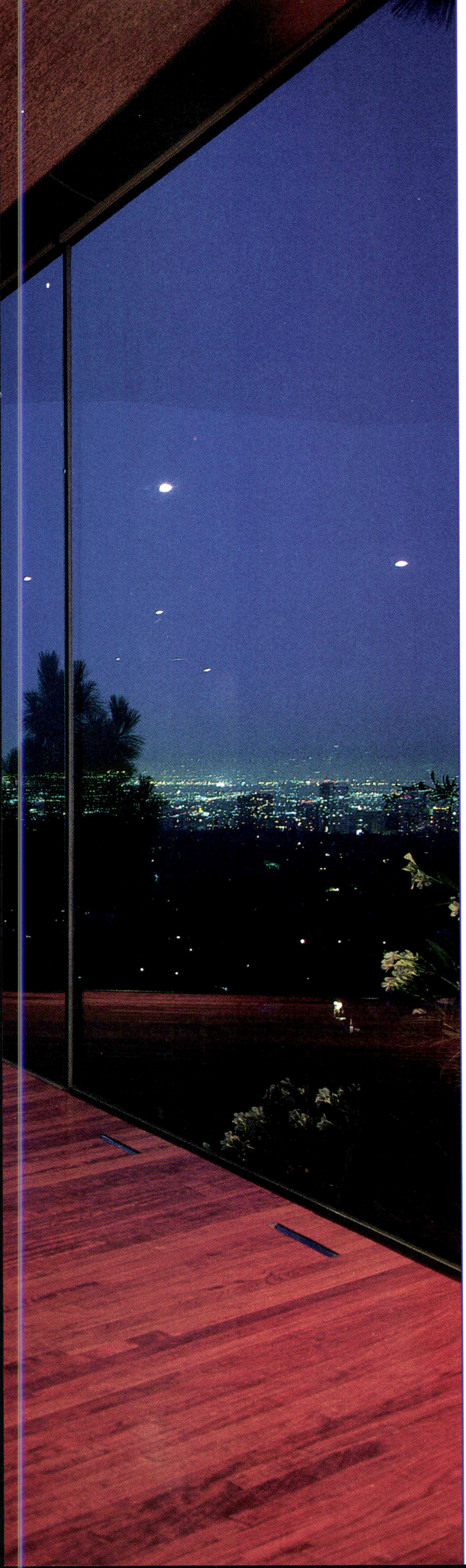
On the other hand, this residence is a far more urbane solution than is found on the average quarter-acre lot. As an assemblage of separate structures around courtyards, it is a model for a denser settlement in the city, perhaps as three apartments with their own private spaces. Jones-Evans revisits territory explored in earlier Modern houses, such as Mies van der Rohe's courtyard houses. Like those proposals, this home is an exception: Most suburbs in Australia, as in the United States, favor the traditional freestanding house with front and back yards. But today this model is losing currency, given the need for more compact and affordable alternatives. The Gallery House suggests that there are successful alternatives for the standard house lot. Its relevance is supported and enhanced by its concern for optical pleasures. **Carey Lyon** ■

The author is a practicing Melbourne architect with Perrott Lyon Mathieson and is a contributing editor to Australian architectural journals.

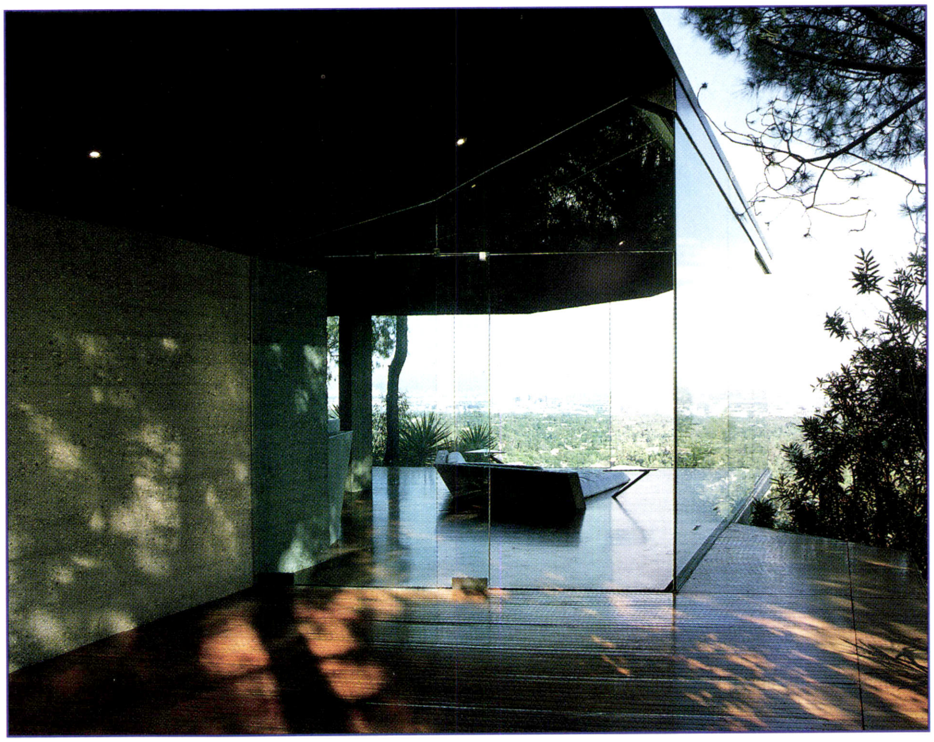
Project: *Gallery House.*
Architect: *Dale Jones-Evans, Melbourne, Australia.*
Client: *Holly Jones-Evans.*
Site: *a narrow quarter-acre lot in a densely settled suburb, with street and alley to the front and back. A Victorian rowhouse and a nondescript low-rise apartment building flank the site.*
Program: *a 2906-sq-ft, 3-bedroom house with artist's studio and gardens that incorporate existing trees.*
Structural systems: *steel frame, timber frame with plywood bracing, blockwork on pad, strip footings.*
Major materials: *cement, clapboard, pure zinc shingles, galvanized iron on exterior; plaster, clapboard, ceramic tile, jarrah wood flooring in interior.*
Mechanical system: *gas central heat.*
Consultants: *John Gardener and Associates, structural.*
General contractor: *Dale Jones-Evans.*
Photos: *Trevor Mein Photography.*

Evolving Aerie





A private retreat in the hills above L.A., established 28 years ago by architect John Lautner, continues to develop under his direction.



2

John Lautner's Goldstein House is a remodeling of his Sheats Residence of 1963, or, more accurately, a continuous, perhaps never-to-be-completed project that represents an extraordinary 18-year collaboration between the octogenarian architect and the present owner. The outlines of the original structure remain unchanged. The original footprint and square footage are roughly the same – about 5,700 square feet, including the terraces.

The house is perched on a hillside affording a panoramic view of the Los Angeles basin and the Pacific Ocean to the south. The structural tour-de-force is the tent-like roof of the living room, a freestanding structure of cast-in-place concrete, with an all-glass south wall open to a terrace and swimming pool, and the vista beyond.

Instead of being a redefinition of the original Sheats House, the Goldstein House represents, in part, a process of simplification. Lautner has cleared away a claustrophobic honeycomb of rooms to form a single "media room," oriented around a television and a bed-sized, leather-covered sofa. The glass walls, formerly held in place by steel mullions that looked structural, are being

A grandly scaled couch in the remodeled master bedroom suite (1) overlooks the city and the ocean beyond. Mullionless tempered glass replaces a steel-framed system dating from the original construction in 1963. A view of this same vantage point by day (2) shows the extension of the space onto the exterior wood deck and the contours of the ceiling, which is the underside of the concrete supporting structure for the terrace above.

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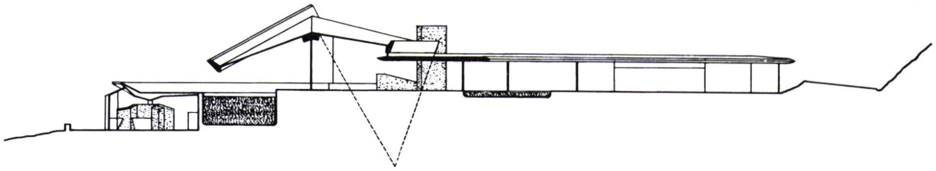
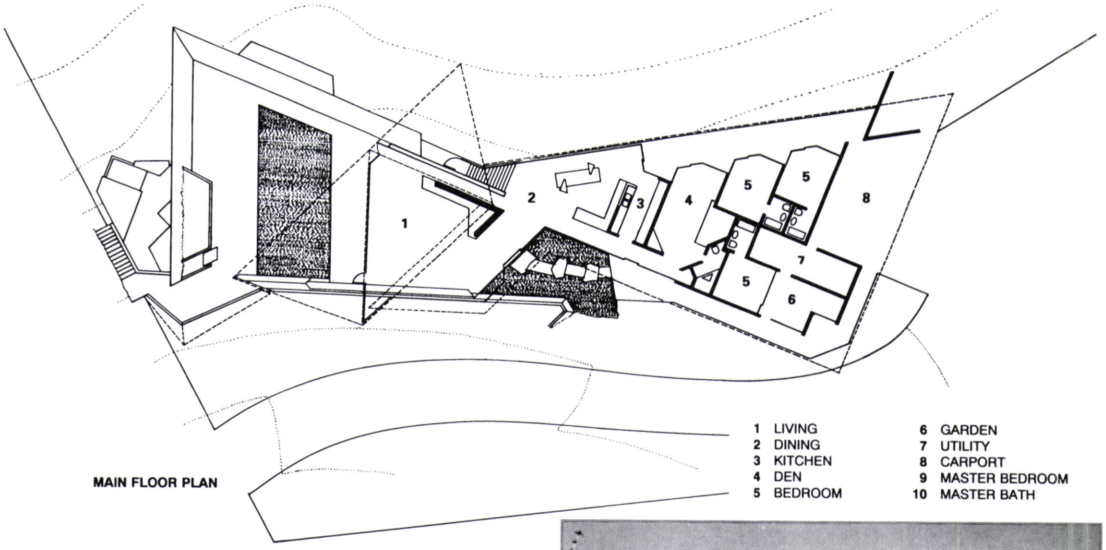
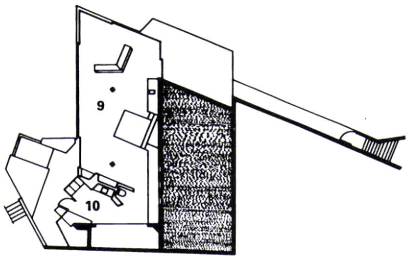


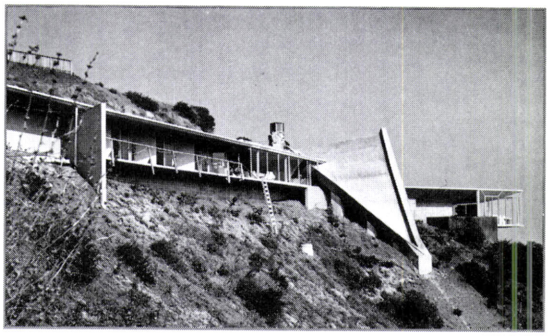
SECTION LOOKING SOUTHWEST



MAIN FLOOR PLAN



LOWER FLOOR PLAN



CONSTRUCTION PHOTO FROM WEST, 1963

progressively replaced with floor-to-ceiling tempered glass, more in keeping with Lautner's liking of complete transparency along perimeter walls.

Beyond simplification, the Goldstein remodel also represents a process of enrichment. Like his mentor and one-time employer Frank Lloyd Wright, Lautner likes built-in furniture, giving it an architectural character that speaks to the larger geometrical schema of the house. In the Goldstein residence, the built-ins are mostly of cast-in-place concrete with a stony and almost-monumental character. In the newly refurbished bedroom, a bathroom suite is framed in monolithic cast-in-place pieces. At the client's request, the existing bedroom walls and ceiling were bush-hammered to remove paint and expose the rocky texture of the concrete aggregate, while new concrete has been sandblasted.

Homeowner James Goldstein's comments on being a client of the iconoclastic Lautner are revealing: In contrast to Wright, he says, Lautner is not dictatorial. "We never argue. He is almost too agreeable." Lautner typically responds to his client's requests with several suggestions, often pushing a novel idea one step further. For the bathroom adjoining the bedroom suite, Goldstein asked the architect to position the sink into the south "view" wall. Lautner responded with an all-glass sink (page 92), which doubles as an exterior window.

Designed for a single man, the Goldstein House presents a sort of utopian fantasy of being close to nature while living within a high-tech environment of electronic gadgets. It's the ultimate bachelor pad. At the touch of a button, the skylight above the dining-room table slides away to reveal a rectangle of sky. In a corner of the bedroom with the choicest view, another button makes the corner walls silently retract, leaving the floor hovering vertiginously above the steep downslope; a built-in couch is the ideal viewing post for this performance. For some visitors, this vision of technology as a behind-the-scenes genie may seem dated, bringing to mind the the 1960s futurism of the Jetsons and James Bond. But if its high-tech appurtenances may not to be to every taste, the Goldstein House remains an example of mutual devotion and parallel sympathies between a client and an uncompromising architect. **Morris Newman** ■

The author, P/A's Los Angeles correspondent, is Senior Editor of California Planning and Development Report.

Lautner on Modernism

Asking John Lautner about Modernism, or indeed about any formalist notion of architecture, is asking for trouble. The still-maverick 81-year-old has no use for Modernism or its adherents. He cannot name either a Modernist architect or project that he admires. Even the work of his fellow Californian and Frank Lloyd Wright alumnus, the late Richard Neutra, does not impress him. "He did one job and repeated it all his life," says Lautner.

Lautner's disdain for Modernism is part of a larger rejection of what he describes as design philosophies oriented toward "graphics" rather than toward quality of life. He especially rejects what he sees as the façadism of much recent work. "There is nothing charming, delightful, beautiful, or intriguing for human beings at all," he says of recent work in Los Angeles. He sees his own work as ahistorical. "Timelessness is a quality of real architecture." Not surprisingly, he also rejects all labels for his own work, although the late Esther McCoy's description of Lautner as a "lyrical technologist" seems apt.

Lautner still professes admiration for Wright, who hired him in 1933, and for whom he worked until 1940. Wright, he says, "decided to create beautiful spaces for human beings and not for style," adding that magazine editors "packaged organic architecture as a style, which is wrong."

Despite the ideological differences, however, there are aspects to Lautner's work that Modernists might admire: his bold and simple geometry, his technological skill and derring-do, and a notion of architecture-as-space which does not seem far from the ideas of such Modernist critics as Giedion or Zevi. Most of all, he shares with Modernist philosophy a desire to fit the building to the need: a goal voiced by many architects, but rarely pursued as single-mindedly. Even his critics must be impressed by the agreement between his ideology and his practice, in contrast to those of some practitioners of the International Style, who talked about functionalism while designing white boxes for all purposes.

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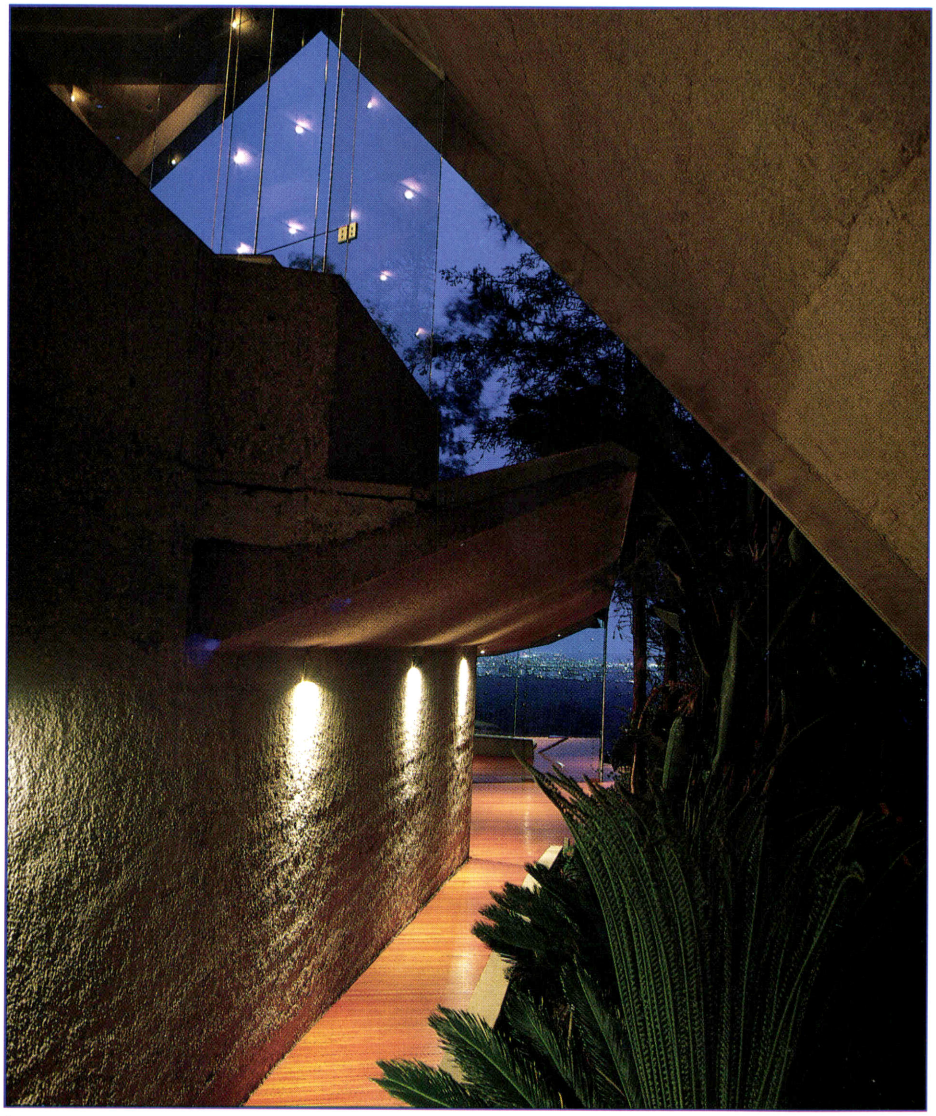

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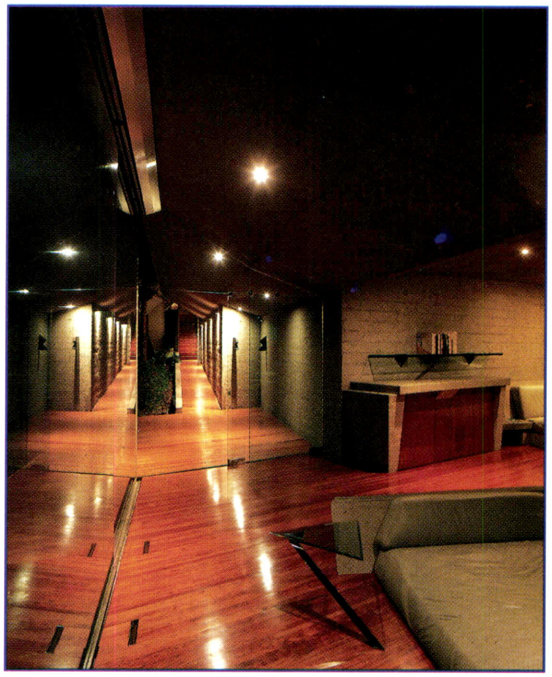

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The living room (3) is sheltered by the original triangulated concrete canopy and overlooks the pool terrace. A lower portion of the same canopy shelters the passage (5) that leads to the remodeled master bedroom from the stairway. A view back down this corridor (6) also shows some of the room's new cabinetry, made in part of concrete. The inner wall of the room (4) has windows looking into the depths of the swimming pool.

At the east end of the remodeled master suite, a new bath projects onto the deck (7) that surrounds the outdoor tub. The angular glazed enclosure (8) relates geometrically to the canopy over the living room above. Inside (9), the space is separated from the bedroom by massive concrete slabs. A technical tour de force is the all-glass wash basin that maintains the transparency of the bathroom wall (9); water spouts from a sensor activated channel, can be retained by a glass stopper, and drains through another transparent channel.


7

Project: *master bedroom suite remodeling, James Goldstein house, Los Angeles (originally Dr. Paul Sheats house, 1963).*
Architects: *John Lautner, FAIA, for original house and remodeling (Andrew Nolan, project architect for master bedroom remodeling).*
Site: *slope toward southeast, overlooking Beverly Hills; 53,000 sq ft.*
Program: *remodeled master bedroom suite for 11,000-sq-ft single-family house.*
Structural system: *cast-in place concrete for all floors, master bedroom, pool, living room roof; rest of house wood and steel frame.*
Major materials: *exposed concrete, glass, granite, stainless steel, redwood and bubinga wood (see Building Materials, p. 151).*
Mechanical system: *radiant floor, with forced air in master bedroom.*
Consultants: *Joe Porterfield, structural; Andrew Nasser, structural for master bedroom remodeling.*
Costs: *withheld.*
Photos: *Alan Weintraub; construction shot: Julius Shulman.*


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Perspectives

Glynis Berry examines the Japanese view of nature and its relation to architecture.

Nature and Architecture in Japan

The concept of nature is often a point of contention, or at least misunderstanding, between the East and the West. The Eastern image of nature is closer to our concept of environment, making the Japanese more willing than Westerners to fashion artificial landscapes that invoke nature through signs. This custom allows the Japanese to establish connections to nature even as daily life becomes further removed from it.

In Japan people are considered an important part of nature, not a separate entity. Juxtapositions of artificial and natural objects are not abhorred, but are considered natural; in fact, the presence of a person's handiwork within a natural context is often preferred. This human presence within nature differs from the Western preference for an "unspoiled" nature where the intrusion of people is seen as a contamination.

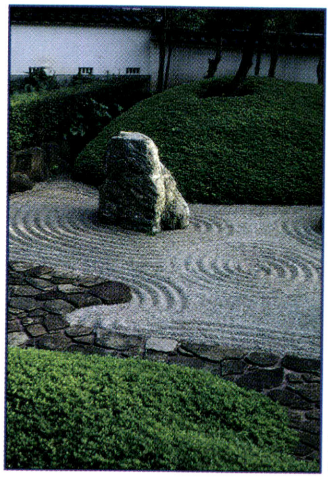
The traditional Japanese garden epitomized this view of nature. The gardens were artificial worlds using natural materials for media and familiar landscapes as models. For instance, rocks portrayed waterfalls, while pebbles rounded by the waves formed seas. Many were direct quotations of favorite vistas, like Mount Fuji or Hangzhou in China, and others recalled experiences rendered familiar through shared cultural teachings. These constructed microcosms, in other words, symbolized a larger nature; nature had become a symbol of itself.

The notion of nature as an ideal retreat is common in both Eastern and Western thought. The difference is that Westerners feel they must actually live amidst this purifying landscape. Because people normally lack the opportunity to do this, the Japanese look to the sensual, visual, and spatial symbolism of their gardens as a reminder of the ideal life in nature and as a mental refuge from the pettiness of normal living. The Japanese do not need to be surrounded by nature to feel its presence; they can live without a tree. But this does not mean they lack an understanding of nature. Just the opposite.

Second Nature

Masaharu Takasaki, a young visionary architect, defines "second nature" as the artificial forms associated with the community and its environment. Here the city replaces nature as the primary environment; the density, changing light, cacophony of human endeavors, irrational episodes, and juxtapositions of the built environment form their own "natural" world.

> **"The Japanese do not need to be surrounded by nature to feel its presence. They can live without a tree."**


Glynis Berry

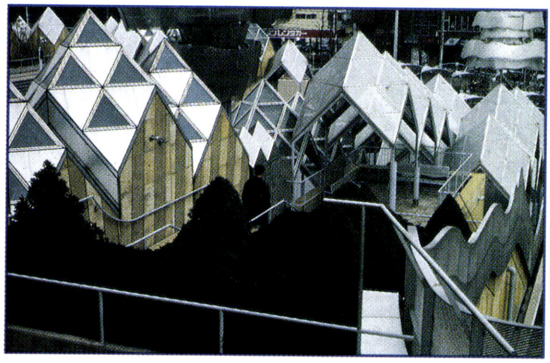
"Karasansui" (dry mountain and water) garden, Komyo-ji Temple, Kamakura.

Japanese architects respond to this "second nature" – the city environment – in basically two ways: restricting urban stimuli or embracing them. For example, Tadao Ando (P/A, Feb. 1990, p. 83) filters or even shuts out the urban scene, allowing only the untarnished effects of light to play upon carefully placed walls. By simplifying the palette to the physicality of concrete and the ephemeral qualities of light, he instills an awareness of the richness of a limited urban "nature." Osamu Ishiyama, in contrast, embraces urban stimuli. When he was asked why his Fukuoka Housing Project (P/A, Aug. 1991, p. 73) was described as a forest, he replied that he divided his building into three parts to give a sense of irrationality, similar to the feeling one would have standing in a forest rather than on a European street.

An appreciation for the urban, chaotic environment does not require an abandonment of control. Used to compose the visual experience, *shakkei* is a concept familiar to both traditional and avant-garde architects in Japan. Originally used in gardens, *shakkei* is a method of framing views, of blocking from view unseemly middle grounds. Distant scenery and immediate, controllable foregrounds are combined to create a total landscape, where a series of carefully composed views invites aesthetic enjoyment and a heightened awareness of the commonplace. It is not a picture statically placed on the wall so that the viewer becomes blind with familiarity, but a composition that people can discover anew with each encounter.

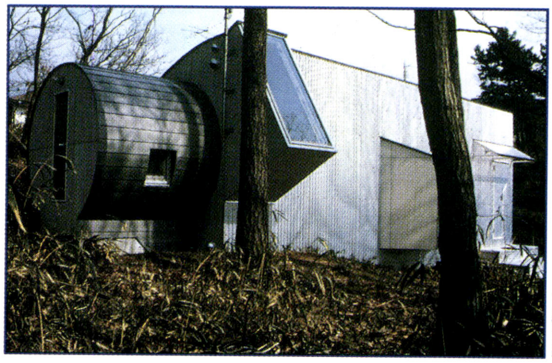
Kazuo Shinohara used the time-honored approach of framing views when designing a structure that delights in colliding disparate forms in celebration of the anarchy and cacophony found in urban environments. In his "House in Yokohama," where he now resides, windows were rotated and twisted to frame natural rather than urban compositions. Here pure, untrammeled nature, when treated as a visually disconnected fragment for contemplation, becomes artificial.

Whether using natural or man-made materials as the manipulated substance, allusions to nature in Japan are often literal. As mentioned earlier,


Glynis Berry

Roof nature walk, Itsuko Hasegawa's Shonandai Culture Center (left).

Windows aimed at views of nature, Kazuo Shinohara's "House in Yokohama" (right).

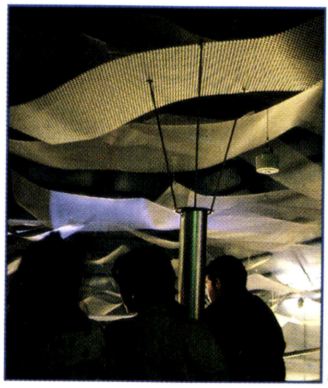

Kazuo Shinohara

there is often a direct correspondence between manufactured compositions and the referenced site in gardens. This directness is not unlike haiku poems that, in only seventeen syllables, describe seemingly straightforward, natural scenes. Yet the simplicity is deceptive, for if one delves deeper, a richer overlay of meaning, mood, and references exists.

The same is true for natural references in architecture. In "Nomad," a bar and restaurant built near Roppongi Station in Tokyo, its architect, Toyo Ito, bent metal sheets to simulate clouds. The building is meant to dematerialize, even though one can easily see the fireproofed beams and windowless walls. Focus is therefore on the installation and the people beneath, with the clouds helping to evoke a seemingly alien environment. One senses an empty, windblown void just out of one's sight, not the overcrowded, jumbled city which exists. The clouds are not only signs of nature, but a masterly control of physicality in the name of architectural poetry.

Third Nature

Probably the most enthusiastic advocate of reestablishing contact with "nature" is Itsuko Hasegawa. She wishes to restore the "natural state" of architecture that has been destroyed by modernism. In this Asian version of nature, the human spirit and its products are intertwined with a natural process encompassing light, wind, earth, water, and fire. When the link to this holistic nature is severed, people often begin a fruitless search for an idealized landscape. Instead Hasegawa uses architecture to create an appealing environment. Rooftops subdivide to form pyramidal caps, recalling distant mountains while adding light and spaciousness to the interiors. In "House in Nerima," she provided spaces that related to both the interior and the exterior. An open court separated the realms of two different generations while a sunroom served as both *genkan* (entry) and filter for the main living space beyond. Acting as a gate, connecting stairs rejoined the two volumes by linking a balcony to the "outside" room and then this room to the "moon-viewing" deck. Beyond simply manipulating functional space, she provided empty stage sets to support changing moods, human drama, and the presence of nature. But when nature was shy, Hasegawa openly embraced what she calls a "third nature," with mechanical recreations of natural forms.


Glynis Berry

Metal clouds in Toyo Ito's bar "Nomad."

Nowhere is this more evident than in her Shonandai Cultural Complex, a children's museum, municipal office, and community facility, including a gym and classrooms. With total abandon, she refuses nothing in the attempt to provide joyful connections with nature. Shells and marbles are embedded in concrete; a canopy of reflectors recalls the sparkle of the night sky; water gurgles as it makes its way to a pool; and some of the clustered rooftops open like tulips to release stifling air. A nature trail winds its way over the top of the building, teaching children about nature as it identifies the artificially introduced trees and animal prints. A mechanical tree moves with the time of day rather than with the breeze, and the evening lights sparkle with human warmth against the mysterious volume of the earth's globe. Hasegawa has reduced a massive volume of functions to a universe scaled for children. The building does not impose a barrier, but invites exploration. Her creations do not have an untouchable artificiality, for they use artifice to stimulate personal experience. This is no longer a nature for contemplation only, but one demanding physical as well as mental involvement. "I use architectural and technological details to evoke nature," she says, "and natural and cosmic details to evoke architecture."

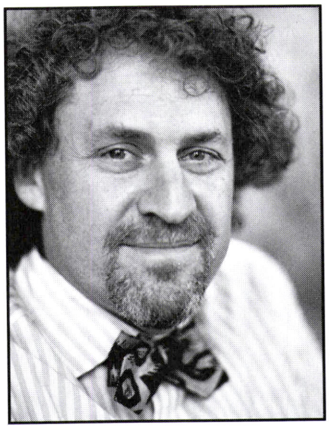
In the 17th-Century the haiku poet Basho journeyed to the natural sites he had known only through words, both older poets' and his own. Through empathy with ancestral thoughts, sparked by a specific site, he was able to breathe power and truth back into the cultural clichés that are the legacy of the Japanese people. Nature was not an isolated phenomenon, but a medium rich with cultural associations and concepts.

Today architects embarking on a rediscovery of nature share the same awareness of a nature replete with cultural references. They have inherited the ability to conceptualize nature. While rapid changes have diminished the physical presence of nature, the sense of naturalness remains. Whether it be through a first, second, or third nature, Japanese architects are continuing to find ways of reconnecting people with their shifting environment. **Glynis Berry** ■

The author is an architect and urban designer working in New York.

Urban designer **Stanton Eckstut** talks about public space, guidelines, and the presence of the car.

Interview: Stanton Eckstut


David Harry Stewart

Stanton Eckstut, FAIA, is perhaps best known for his work – as a partner in Cooper Eckstut Associates – in creating the master plan and guidelines for Battery Park City in New York (P/A, March 1988, p. 86). Since joining the firm now known as Ehrenkrantz & Eckstut Architects, he has been involved in a number of urban design projects in the U.S. Current commissions include a plan for former railyards in Santa Fe, an extension of Baltimore's Inner Harbor, and the waterfront of Long Beach, California. Mark Alden Branch spoke to Eckstut this spring about the firm's design approach; excerpts from their conversation follow.

P/A: Is your firm's recent work a departure from or an evolution of the strict guidelines of Battery Park City?

Eckstut: I think probably you could take the guidelines that are in Battery Park City today and get a lot more diversity out of them than has in fact been accomplished. The envelopes were more regular at Battery Park City than may be appropriate in other places, only because New York has more regularity in certain public environments. I think one thing that's happened with guidelines is that people have overreacted. They're saying that everything needs to have guidelines and be regulated. There are only some parts of cities that need to be given special care, because you don't have important public spaces everywhere. So if you decide what are the most significant places, and you have a certain attitude about what the character of the walls around those spaces should be like, why can't you then let up everywhere else?

P/A: To what extent are you talking about regulating, then? Would you still regulate building envelopes?

Eckstut: I'm not sure that I would. You have to define your priorities – which public environments you care the most about. But once you turn the corner, and you're in a less significant public environment, why is it so essential to keep the rigor when maybe the American culture is not rigor? The places that are seen and experienced by the most people are where you would want to have more to say. In our plan for Santa Fe we may say, "Well, we're creating two new plazas and there's one main street in the city that everyone experiences. So those are the places that we would really work very much on."

P/A: And have more specific guidelines for the buildings that front these spaces.

Eckstut: Yes, and how they would meet an existing building. And how buildings would meet each other, so that they don't exaggerate the differences between them. The reality of American public life is that it's been totally decimated by privatization. We're all in front of television and videos, and we spend very little time in public, and the reality is that we have to try to find ways of making public environments that would start to bring people back to that.

P/A: Are you doing any suburban or edge-city development where there is markedly more emphasis on the car than on pedestrian things?

Eckstut: All of our projects are focused on the car. Because outside of Battery Park City, every project has a suburban parking ratio. People want urban environments with suburban parking ratios. It's true everywhere, because that's the marketplace. And everybody's in a car. So our problems may be somewhat different because we're dealing with denser sites for the most part, in that we have bigger garages and we have to prevent them from dominating the view of important public spaces. I think the suburban thing is not all that different from a lot of downtowns in America. In some places where you're working on a downtown, having a parking lot is of real symbolic importance. It means that things are accessible. And if you take the parking lot away, you're denying a kind of public quality about the place. The car really dominates all of our design work; I'd say at least two-thirds of our design work has to do with not having the parking dominate the view.

P/A: And how do you do that?

Eckstut: By designing the key public spaces, understanding what the key vistas are, and making sure you protect the primary frontages and not allow parking and curb cuts to be in any place that would dominate the view.

P/A: For instance, in the Santa Fe plan, none of the parking faces the public spaces.

Eckstut: Right. It's on the less important streets. But sometimes parking can work in your favor. We have some streets here that, because there's parking, are less desirable environments. I think that's an important part of the design. You can't have a 100 percent address everywhere. So what we try to do is design places that don't work, and aren't great. If we create streets with less value, we can get shops in there that pay less rent, but that a lot of people depend on, like hardware stores and cleaners and things like that, which are missing from downtown because they've maximized the value of downtown to the point where only the most expensive tenants can afford it. So we like the idea of designing things that are partly left over, and not regulated and less valued. I really believe that in some parts of Battery Park City, the back sides are at least as interesting as the fronts. ■

Enlightened patronage in the Dutch city of Groningen has made cutting-edge architecture a popular attraction. **Nancy Stieber** comments on this city's aspirations.

Arwed Voss

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An RFQ to the Avant-Garde

When London architect Zaha Hadid was interviewed last year on the BBC TV's late night cultural program, images were broadcast of the only building she had completed to date: a video pavilion in the Dutch city of Groningen. It was not an isolated instance of whimsical patronage. A visitor strolling through Groningen encounters works completed and in progress by an international coterie of progressive architects, some of whom, like Hadid, owe the city their first opportunity to see ideas become built realities.

At first glance, Groningen might seem to be an unlikely rival to Berlin, Paris, or Barcelona in the arena of architectural patronage. Nevertheless, this capital of the most northerly Dutch province has in recent years pursued a vigorous policy of architectural and planning experimentation. In 1986 the city appointed Josef Kleihues and Rem Koolhaas to supervise the planning of a zone along the southern rim of the historic core. Two years later, Kleihues was given jurisdiction over the core itself as part of an ambitious plan to restore and enhance its livability. Consistent support for architectural excellence and innovation in Groningen has resulted in a wide variety of new construction that is changing the image of the city. In fact, the fresh spirit and venturesome playfulness of the buildings and sites arising out of Groningen's architectural advocacy have given the city a new identity as the

van der Vlugt & Claus

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Zaha Hadid designed a multilevel video pavilion (1, 2) on a small square in central Groningen. Like the four video pavilions that follow, it was executed in association with Karelse van der Meer, a Groningen architect.

Photos: van der Vlugt & Claus

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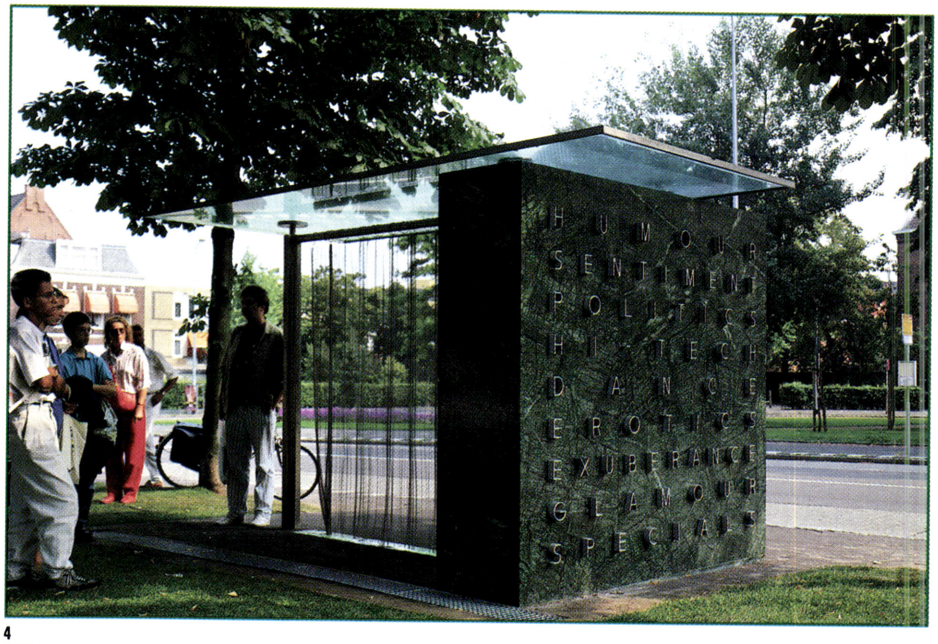

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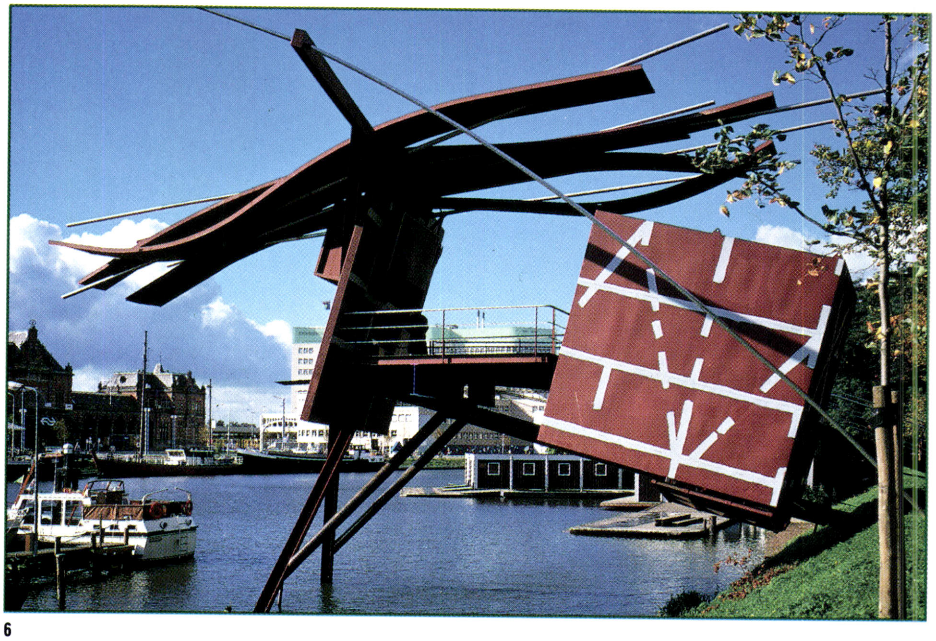

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Netherlands' architectural spearhead. At a time when Amsterdam's ambitious plans for the river banks of the Ij have been swamped in a hopeless political and economic muddle, and when Rotterdam appears to be most concerned with restoring Manhattan to the Dutch by rebuilding it on their native turf, Groningen sets an example for intelligent and effective public patronage.

European cities are girding for fierce competition when national borders open in 1992. In anticipation, they are engaged in a battle of images reminiscent of the era of mercantile city-states, when urban maps and bird's-eye views touted the glories and advantages of each metropolis. In our Post-Modern era of facile image-making, advertising campaigns have replaced old-fashioned boosterism, and cities collect buildings by architectural stars to win international prestige. Groningen has not been exempt: The advertising slogan "Nothing tops Groningen," a play on its geographical position in the Netherlands, is plastered on posters throughout the city. And many would claim that the importation of internationally renowned architects with only fleeting knowledge of the city's rich heritage can but hasten the erosion of its identity, not enhance it.

Nonetheless, there is much to support the argument that Groningen's commitment to architecture transcends trendiness. There is a history of enlightened patronage here: Earlier in this century, the city enlisted the planning expertise of leading Dutch architect H.P. Berlage. In the

Rem Koolhaas designed a Miesian bus stop/video pavilion (3, 4) with a cruciform column and a wire mesh curtain. Coop Himmelblau made its video pavilion (5, 6) a private screening room that slid to open and close.


van der Vlugt & Claus

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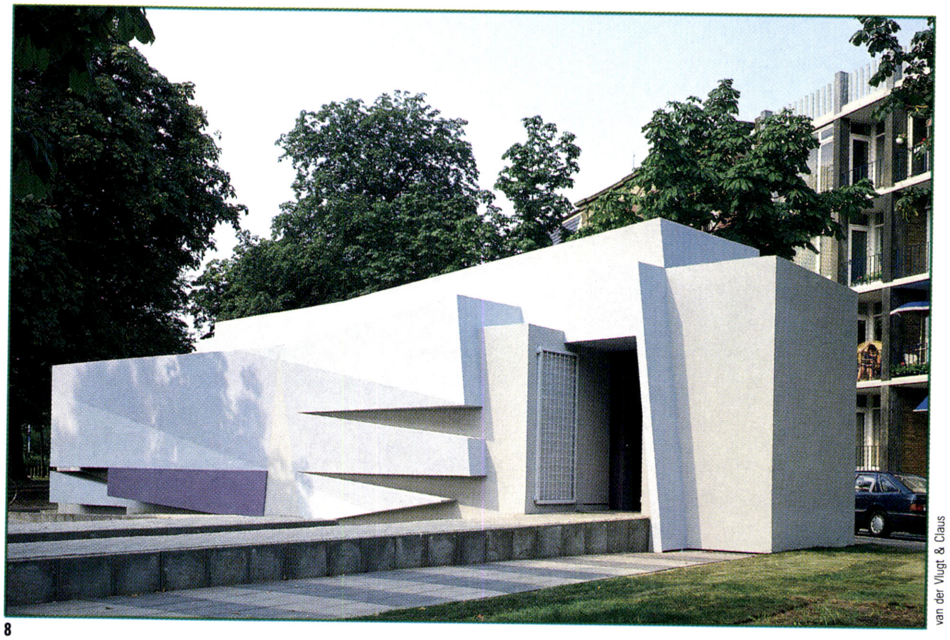
van der Vlugt & Claus

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Pinkster & Tahl

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Pinkster & Tahl

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interwar years, national figures in functionalist and expressionist architecture also won major commissions here, and created neighborhoods of remarkable dignity and grace. Groningen's serious investigation of architecture continues throughout the city. There is notable work under way in the historic core, in the surrounding 19th-Century districts, and in recent suburban extensions that (as in so many other cities) have blurred Groningen's boundaries.

The most dramatic evidence of the city's interest in the new and experimental occurred last year during celebrations of its 950th anniversary. Groningen commissioned five temporary pavilions to display music videos in the historic core. Organized in conjunction with an exhibition at the Groningen Museum, these walk-in galleries brought thousands of visitors off the street and into contact with the innovations both of video art and of an architecture which had previously been sequestered on paper or in museums. In fact, all five participating architects had contributed to the 1988 exhibition on Deconstructivism at New York's Museum of Modern Art: Rem Koolhaas, Zaha Hadid, the Coop Himmelblau partnership, Peter Eisenman, and Bernard Tschumi. Four of the pavilions are located on the site of the city's ramparts, transformed in the 19th Century into a stately boulevard with trees and villas. These architectural follies contrast with their more stolid permanent neighbors, and proved that the public can be excited by new

Peter Eisenman's pavilion (7, 8) followed a "fear and violence" theme with acute angles inside and out. A canted "Glass Video Gallery" (9, 10) by Bernard Tschumi Architects was built in a small city park.

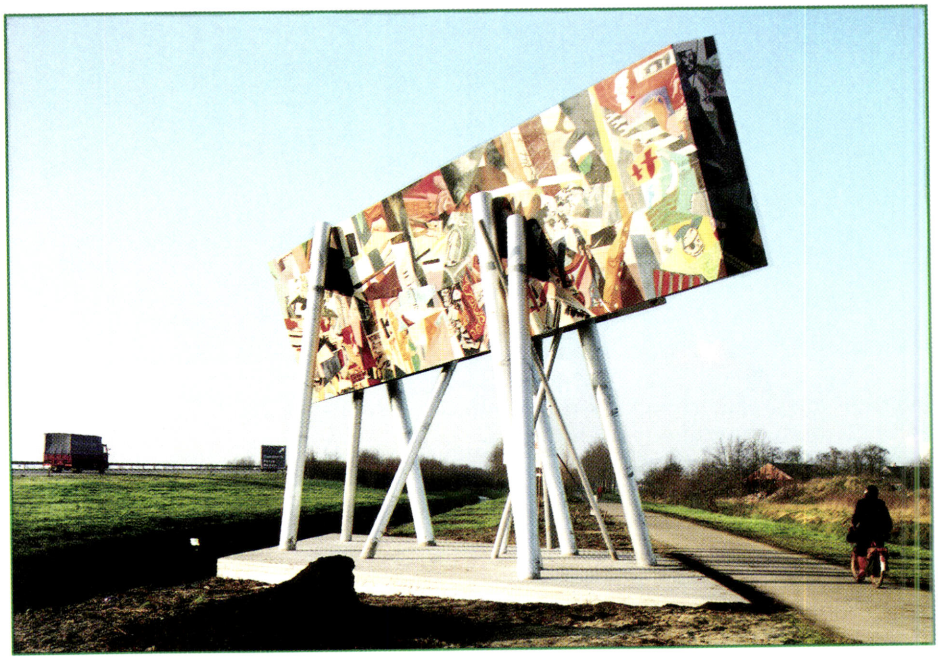
ideas in architecture. During the days they were open, the pavilions were crowded with people as curious about the strange forms of the buildings as about their filmed contents. Now empty and closed, all but Rem Koolhaas's bus stop have lost their original function, and their future remains in question. For the time being, however, the pavilions' sculptural presence continues to transform the city core, stretching its potential, subtly altering its identity, and synchronizing Groningen with the 1990s.

Again, in the center of town, context and modernity have been brilliantly resolved by the narrow yellow brick insertions that comprise the public library designed by Italian architect Georgio Grassi. Now under construction in the university district after delays that included the violent eviction of squatters, the building respects the brick rowhouses of central Groningen, while eschewing any attempt to imitate their decorative elements. The result is a serene urbanity without pretension, a fitting complement to the 18th-Century sobriety of the neighboring façades.

In the southwest sector of the old city, John Hejduk has proposed a horned apartment tower to mark a neglected neighborhood. In a city of proud belfries, this highrise is forthrightly Modern, while its careful siting suggests a sensitivity to the fragile urban fabric. If built, Hejduk's project will join the select number of tall buildings (including twin towers designed by Rem Koolhaas in 1988) that are altering the city's profile. Construction rising above the established low cornice line in the old city has been the exception, however. Most new construction taps the talents of Dutch architects who, while committed to a Modern idiom, are uncompromising in their respect for Groningen's indigenous qualities.

More controversial are plans for a museum to be built on an island in the canal that separates the old city from one of the 19th-Century districts. Frans Haks, director of the Groningen Museum, invited Italian designer Alessandro Mendini to match his own provocative curatorial style. Mendini's project requires zoning changes, and local residents have lodged objections to its placement in the canal. If these obstacles are overcome and planning permission is received, this colorful collection of gift boxes, each wrapped differently, will become a new entry gate to the city for visitors traveling by train.

11



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Photos: City of Groningen

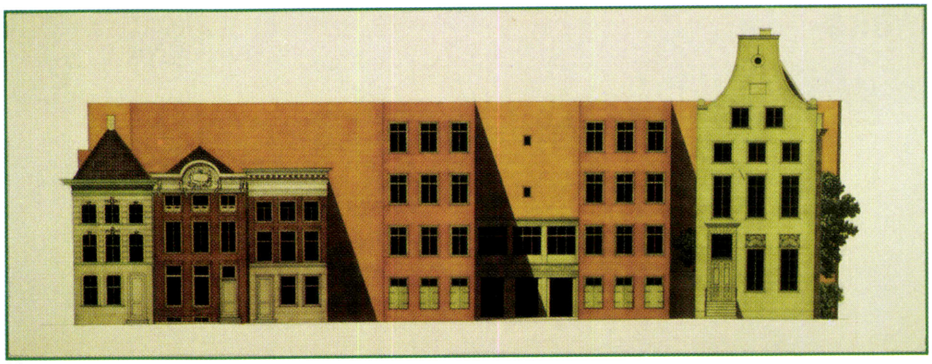
The City Boundaries project was masterplanned by Daniel Libeskind and executed in association with the architect Fokko van der Veen. One of the installations, a tied arcade of trees (11) displays the choreographic sensibilities of its designer, William Forsythe.
"Checkmark," Daniel Libeskind's City Boundaries installation (12), is a text-covered metaphor for the interplay of memory and building.
The gate tower "Clio" (13) by Kurt Forster, an architectural historian, is a steel structure that cites Groningen's earliest mention in historical accounts.

Those arriving by automobile have already been provided with a new set of city markers, symbolic gates to the city placed on the urban periphery in honor of Groningen's anniversary year. The project, "Marking the City Boundaries," initiated by the enterprising Groningen citizen Frank Mohr, and sponsored by the City Planning Department, commissioned Berlin-based Daniel Libeskind to devise a master plan coordinating the design and placement of the markers. Libeskind in turn invited nine participants from diverse disciplines to design the markers. Erected in December of 1990, these reveal a panoply of interpretations of the contemporary city in general and of Groningen in particular. Ranging from simple signs to arcane allegories, the markers have transformed the edges of the city in a manner analogous to the transformation of the core by the pavilions. Spaces previously neglected have been animated by the presence of this mysterious signage.

Architectural historian Kurt Forster's flaming utility tower flashes 1040, the date of Groningen's first appearance in the annals of history. Libeskind's billboard, a collage of images snipped from the pages of an art history textbook, addresses memory, time, and their distortions, while the American choreographer William Forsythe comments on the eternally contradictory relation of man to nature in his compelling arcade of bent trees.

The City Boundaries project confronts the meaning of urbanism in our era of speeding transport, the fax machine, and the video, when national boundaries in Europe are melting away daily. It typifies the Groningen planning department's open and exploratory approach to architecture. That approach has led to commissions for the most accomplished housing designers in the Netherlands, while also addressing esoteric and theoretical definitions of the periphery. Groningen's public patronage is not a quest for flash-in-the-pan pyrotechnics. Its spirit of adventure, its commitment to intellectual stimulation, and its invigorating diversity should be the envy of, and perhaps the model for, American cities addressing their own issues of identity. **Nancy Stieber** ■

The author, an assistant professor in the Art Department of the University of Massachusetts/Boston, has been conducting research in the Netherlands on the image of fin-de-siècle *Amsterdam.*



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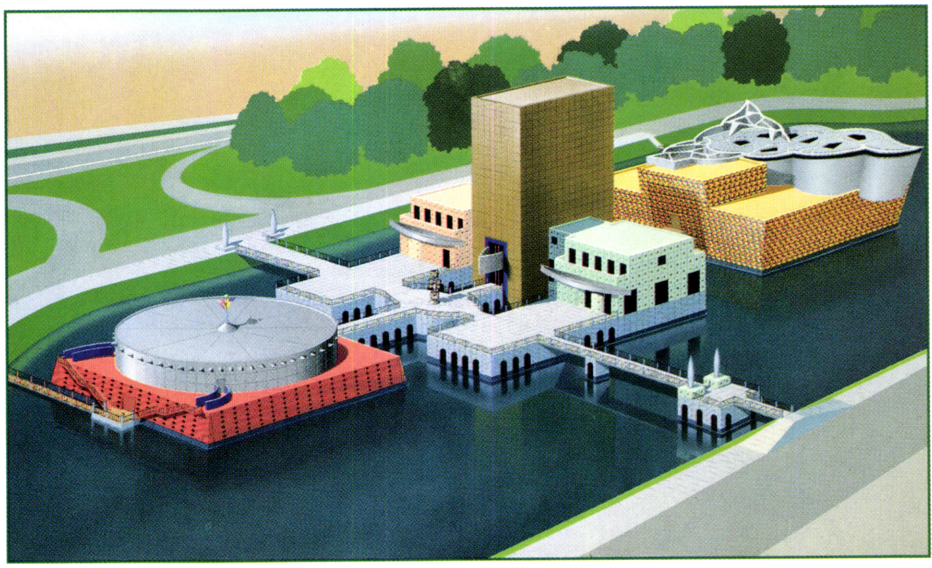

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Photos: City of Groningen

In Groningen's new public library (14), designed by Giorgio Grassi in association with C. Kalfbeek, a pair of Modern bays will flank the entrance to the main part of the library, set behind established rowhouses.
John Hejduk's tower of 12 apartments (15) is designed as a modern counterpart to the spires of Groningen.
The aqueous site of the Groningen Museum (16) by Alessandro Mendini will enhance the fantastic quality of the architecture.

Books

Germany, Crucible of the Modern City

Industrial technology built and then nearly destroyed modern Germany.

Mary Pepchinski reviews three studies of the milieu that formed its cities.

Books of Note

Amazing Architecture from Japan *by Hiroshi Watanabe, foreword by Sally Woodbridge, Weatherhill, New York, 1991, 139 pp., illus., $24.95, paper.*
Insightful vignettes on works by Japan's "atelier architects" – those who view architecture primarily as an art – provide a context for this heterogeneous collection of recent work.

Postmodernism, or, The Cultural Logic of Late Capitalism *by Fredric Jameson, Duke University Press, Durham, 1991, 438 pp., illus., $34.95.*
A literary critic, Jameson argues that Post-Modernism is (was?) a cultural phenomenon induced by a new economic landscape. Jargon-laced prose makes for challenging but worthwhile reading.

The Unromantic Castle *by John Summerson, Thames and Hudson, New York, 1991, 288 pp., illus., $35.*
Summerson blazes through England's architectural history with characteristic eloquence. Not merely for Anglophiles, these essays, written between 1940 and 1981, have universal appeal.

Alvar Aalto: The Mature Years *by Göran Schildt, Rizzoli, New York, 1991, 328 pp., illus., $50.*
Schildt discusses Aalto's personal life and its reflection in his work in the third installment of a four-volume biography.

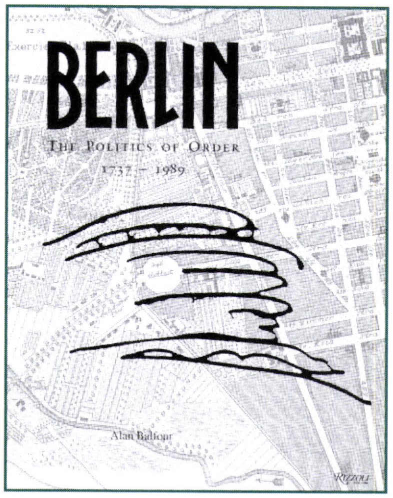
Germany's unification has transformed its cultural landscape. Now that the east/west border is obsolete, buildings central to the development of Modernism in the former German Democratic Republic (such as the Bauhaus in Dessau) can be easily visited. To complement this accessibility, a trio of new books attempts to broaden our understanding of the important architectural and urban ideas that Germany produced.

Brian Ladd's *Urban Planning and Civic Order* is an impressive study. Using Düsseldorf, Cologne, and Frankfurt-am-Main as focal points, the author reveals how attitudes about modern cities as well as the nature of their infrastructures came into being.

Between 1800 and 1850 many German cities demolished their defensive walls. There were economic and political transformations as well: Serfs were freed, the guilds lost power, and other feudal structures were dissolved, permitting land to be bought and sold. With growth and industrialization, new institutions were developed to replace those that had existed for centuries.

Urban governments were based on the concept of *Selbstverwaltung* (self-administration) and comprised elected members and professional civil servants. During the course of the 19th Century, they oversaw the establishment of transportation networks, sewerage systems, and public baths. They created the concept of zoning, commissioned and executed urban plans, and reacted to public debates on aesthetics and the preservation of historic structures.

The reader is left with the impression that much Modern architecture, particularly the *Siedlungen* (housing estates), was destined to flourish in the early 20th Century because the ground work was laid out by urban planners in the preceding century. Indeed, for anyone interested in the development of German Modernism, this stimulating study proves to be interesting reading.



Berlin: The Politics of Order 1737–1939, *by Alan Balfour, Rizzoli, New York, 1990, 269 pp., illus., $39.95.*

Planning and Civic Order in Germany 1860–1914 *by Brian Ladd, Harvard University Press, Cambridge, Mass., 1990, 326 pp., illus., $37.50.*

Figures of Architecture and Thought: German Architecture Culture 1880–1920, *Rizzoli Essays on Architecture, vol. 2, by Francesco Dal Co, Rizzoli, New York, 1990, 344 pp., illus., $29.95 paper.*

Figures of Architecture and Thought by Francesco Dal Co is a collection of four previously published texts. Three cover roughly the same epoch as Ladd's book; the fourth is centered on Mies van der Rohe and can be seen as an afterword. The author sees this period in Germany as one of the most consequential in the development of Modernism with "the most theoretically compact and significant corpus of ideas and...perhaps the most symptomatic experiences of 'Modernity.' " The essays are supplemented by a selection of writings (in English) by key German figures such as Behrens, Tessenow, Bahr, and Simmel.

In his most all-encompassing essay, "On the Cultural Tradition of the Werkbund," Dal Co is pessimistic about the architecture promulgated by the Werkbund, particularly the *Siedlungen* of the 1920s. He faults its rejection of Olbrich's buildings at the *Künstler-Kolonie* (Artists Colony) of Darmstadt (1901) for the functional paradigm represented by Gropius and Meyer's Fagus Factory (1911). In this choice, Dal Co sees a "Modern poverty," and writes, "It is not accidental that the Fagus plant 'anticipates' only itself; it is the most sterile of Modern 'manifestoes,' for the future that it announces bears the sign of pure function, this being the one value that is not accompanied by any style."

Was the ultimate outcome as disappointing as Dal Co suggests? While America's impression of

(continued on page 146)

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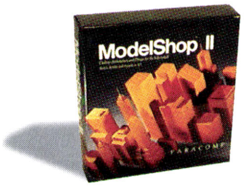

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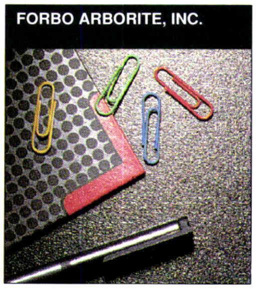

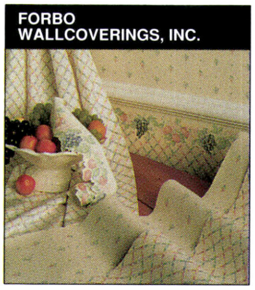

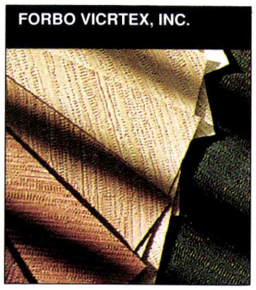

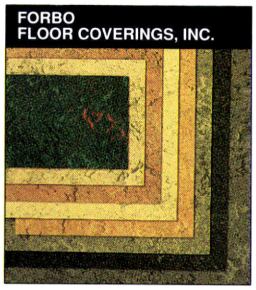

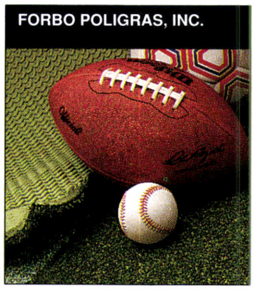

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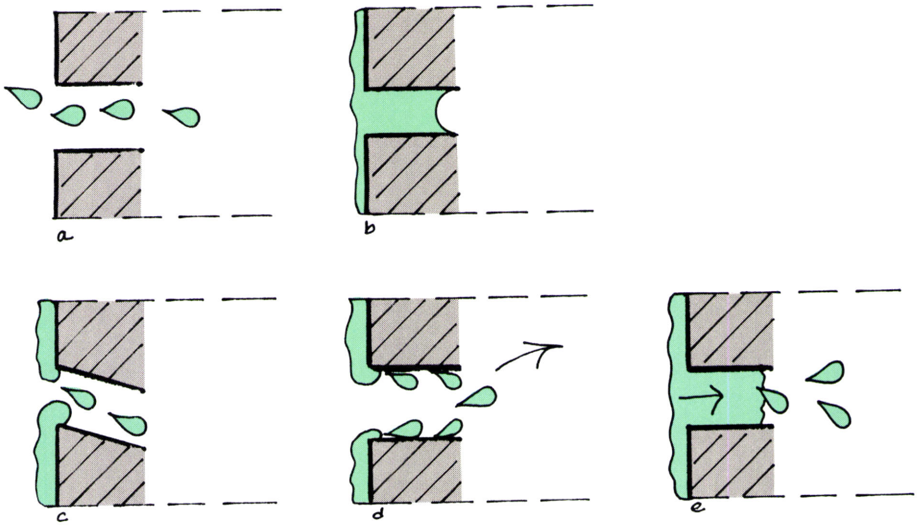
LEAVE THE
STONE AGE
BEHIND

Technics Focus
Cladding

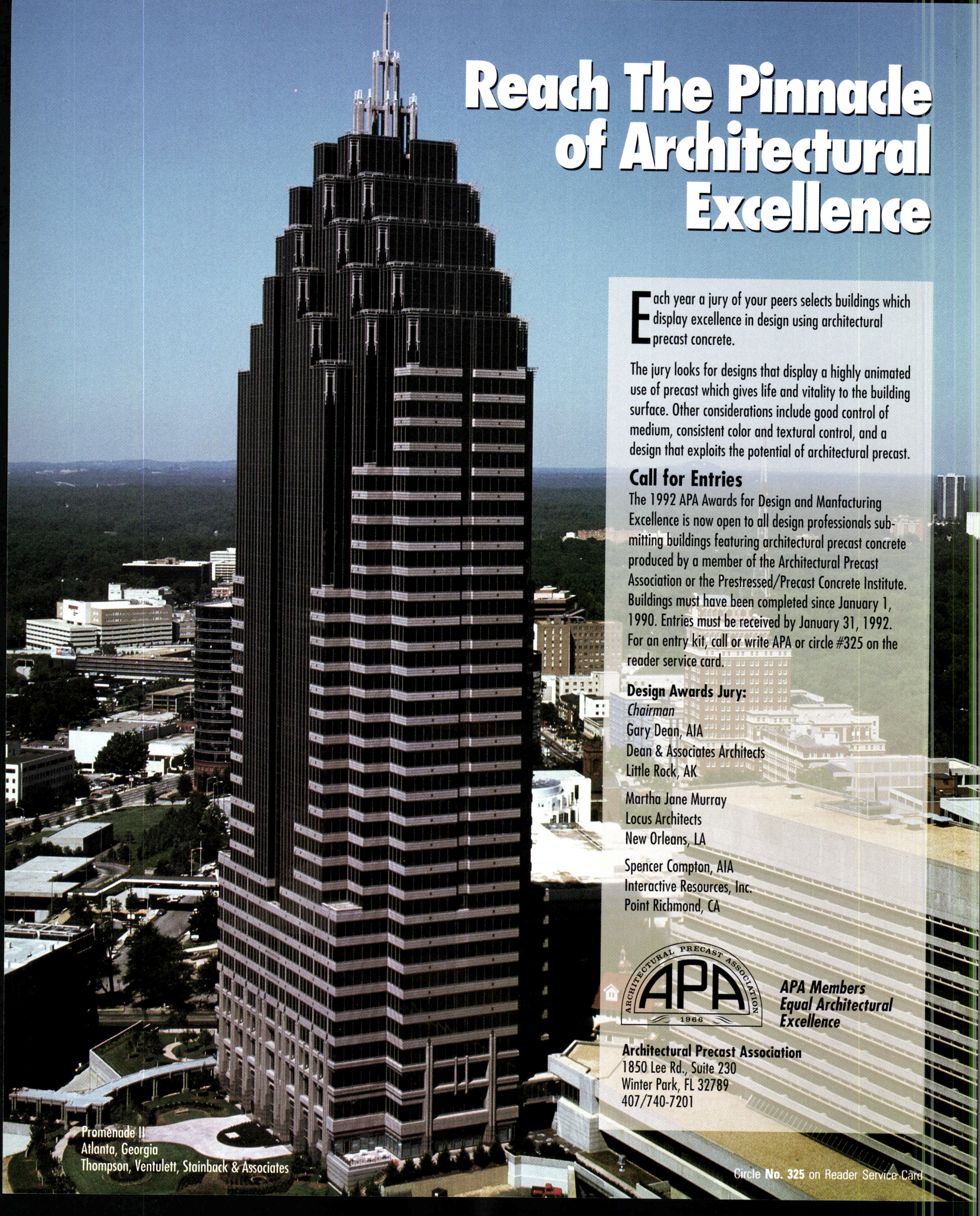
Contents

This month's Technics Focus provides a step-by-step approach to the design of sealant joints, describes the details and problems of barrier and cavity wall systems, and outlines options and issues in selecting anchoring systems for thin stone panels.



Redrawn by Leslee Ladds

*In his seminal paper describing the rain screen principle, "Rain Penetration and its Control" (*Canadian Building Digest *40, April 1963), G. Kirby Garden identified the following five mechanisms of water entry through claddings: (a) By their kinetic energy, rain drops may freely enter openings greater in width than 3/16"; (b) Capillary suction can draw water through openings less than 1/50" in width; (c) Gravity will drain water downward through openings and large capillaries greater in width than 1/50"; (d) Water can be dragged along the internal surfaces of openings wider than 3/16" by air leakage currents; (e) Even small air pressure differences between the exterior and interior can force into the wall a film of water that would otherwise bridge exterior cracks from 0.5 mils to 1/4" wide.*



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Building Façade Watertightness

Engineers **James C. Myers** and **Stephen S. Ruggiero** of Simpson Gumpertz and Heger, Inc.

survey the pros, cons, and details of barrier and cavity wall cladding systems.

Water leakage through exterior walls damages not only wall structures and interior finishes, but also designers' reputations and relationships with valued clients. To guard against this, the designer needs to assess the long-term watertightness of various exterior wall systems during the preliminary design stage and convey his or her evaluation to the building owner. The owner can then make an informed decision as to which system best meets the project's needs with a clear understanding of the likelihood of leakage, the consequential damages from water entry, and the costs and disruption associated with repairs and maintenance.

Barrier Walls versus Cavity Walls

Wall systems are categorized according to redundancy of protection against water penetration and the use of secondary internal collection and drainage elements as either *barrier* or *cavity* systems. Barrier walls rely solely on the exterior cladding and surface seals at joints to prevent water penetration. Most have little redundancy and little tolerance for construction variations and defects. Barrier walls generally are problematic because of imperfect workmanship, in-service degradation of materials, and lack of maintenance of joint seals.

Cavity walls avoid a fundamental drawback of barrier walls in that the exterior veneer and joinery shed most of the water, but are not the sole barrier to water entry: A secondary or back-up system – such as internal gutters or a wall cavity with through-wall flashings – collects water that inevitably penetrates the cladding surface and drains it back to the exterior. With properly constructed secondary drainage systems, cavity walls are very dependable.

In addition to barrier and cavity walls, there are hybrid systems that combine aspects of both. To assess the watertightness of different wall systems, designers must look at the specific cladding material and the treatment of joints and wall openings.

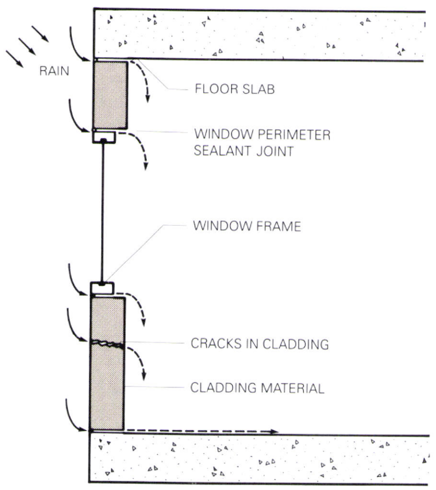
Cladding Materials

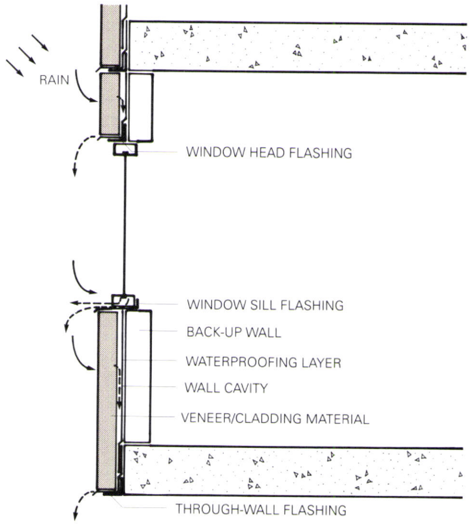
The permeability of the cladding material must be considered in assessing the importance of a drainage cavity behind a veneer. Water penetrates most claddings through cracks or voids, although absorption dominates with a few materials. The likelihood of cracks developing during construction and weathering, or in response to thermal and moisture cycles, should be considered in design.

Some cladding materials are so likely to contain cracks that they cannot make an effective barrier wall. For example, single-wythe brick veneers develop brick-to-mortar separations because of material and construction variations. Proper selection of masonry materials and complete filling of mortar joints can minimize – but not eliminate – water penetration through brick veneers. Other cladding materials, such as metal-framed glass curtain walls and granite veneers, are not generally susceptible to cracking unless they are damaged during installation or are poorly designed. However, the impermeability of such materials does not guarantee watertightness because of the numerous joints in the system.

Some materials pose intermediate risks of cracking, but the designer can usually reduce these risks to allow fairly effective (but not perfect) barrier wall performance. Architectural precast concrete wall panels, for example, can develop full-depth cracks, usually at re-entrant corners. Proper quality control in manufacturing and in handling during erection can reduce full-depth cracks in the field of the panels. Using panels with simple geometries (rectangular, without "punched" openings) and anchorage arrangements to avoid restraints that can cause thermally induced bowing further reduces the likelihood of cracking.

Several cladding materials used commonly as barrier systems can be upgraded with advance planning, but this usually increases initial cost. Aligning horizontal joints in the cladding with window heads and sills permits installation of continuous bands of through-wall flashing. Constructing a cavity and





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1 *Barrier wall (sometimes called "face-sealed") systems rely solely on the watertightness of the cladding and joints to prevent leakage to the interior. Water that penetrates the exterior surface ends up trapped within the wall, where it may cause corrosion, rot, mildew, and damaged interior finishes. One advantage of barrier systems is that sealant joints are accessible for inspection and maintenance.*

2 *Cavity walls provide a secondary line of defense against water penetration by means of flashings, (sometimes) internal gutters, and weep holes that collect the water and drain it back to the outside. While the watertightness of the outside surface is less critical than in barrier systems, the long-term performance of cavity wall assemblies depends on the durability of these internal elements.*

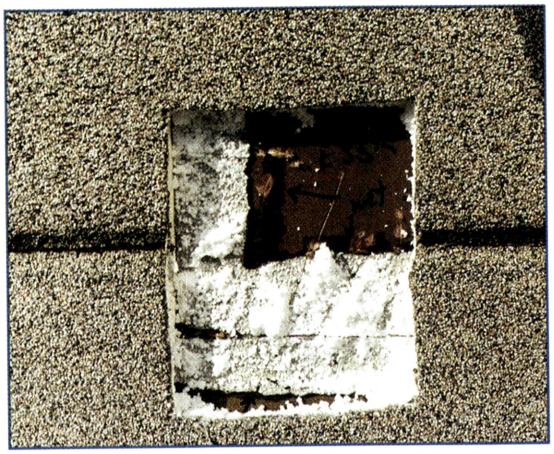
Water may penetrate and cause degradation of materials within both barrier and cavity wall systems:

3 *Water penetration into an EIFS barrier wall system wetting the gypsum sheathing.*

4 *Water penetration through a single-wythe brick veneer: Note mold on exterior gypsum sheathing around inspection opening. The exterior face of sheathing is not covered by a waterproofing layer.*

5 *Structural degradation in an EIFS wall with rust consuming the stud track. The gypsum sheathing core at bottom of wall is disintegrating and the paper facer is moldy and has debonded.*

6 *Corrosion of galvanized steel studs and tracks behind a brick veneer with improper flashings.*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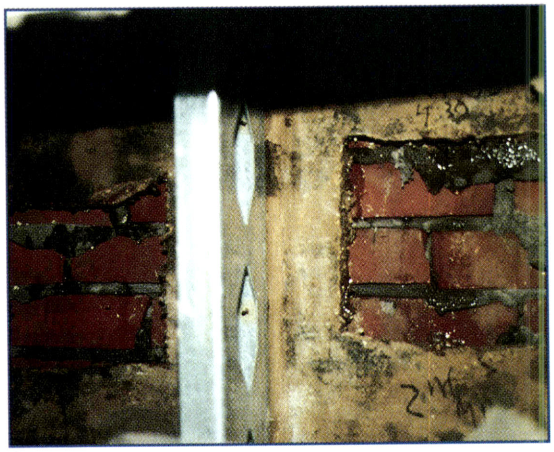
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Sealant Joint Weaknesses

Water penetrates through and around sealant joints because of material, installation, and substrate defects. Many sealant materials developed in the 1970s harden with age and during cold weather. Many elastomeric sealants developed in the 1980s have overcome this drawback, but some still degrade significantly from in-service stress and weathering.

Expecting the field application of these materials to be perfect is unreasonable. Preparing the surface, positioning the backer rod, and gunning and tooling the sealant also provide numerous opportunities for error.

Substrate surfaces are not always sound, and any discontinuity in the substrate can allow water to pass around an otherwise good sealant joint. Precast concrete wall panels commonly develop hairline shrinkage cracks, particularly at the panel edges and corners of discrete openings. Pinholes along the sealant bond line also are inevitable where rough or exposed-aggregate finishes are used, such as with some precast concrete and EIF Systems.

waterproofing layer behind precast concrete wall panels requires careful coordination so that the waterproofing can be completed as each of the panels is erected.

Designers must evaluate the consequential damage to the cladding's structural system as a result of water leakage. Material durability is generally more important in barrier walls, since they are more prone to water penetration than are cavity walls. Light-gage steel framing and gypsum sheathing used for structural support of such barrier claddings as Exterior Insulation and Finish Systems (EIFS) can degrade rapidly and require costly repairs as a result of water penetration. Other systems, such as precast concrete wall panels, use relatively thick steel angles and other anchors for structural support, and can tolerate some water entry without significant structural deterioration.

Joints

Cladding joints generally are the weakest link in wall watertightness. Mechanics typically seal joints during construction with elastomeric sealants that cure into solid rubber. Ultraviolet radiation, moisture, and stresses created by joint movement tend to break the polymeric bonds of most sealants and to reduce their service life to less than that of the cladding material. Application and substrate deficiencies further reduce the dependability of single external lines of sealant. Some EIF systems have failed cohesively along the bond line because prolonged exposure to moisture softens the coating [P/A, Oct. 1989, pp. 107–108].

Given the numerous material, applications, and substrate factors, some water penetration at joint seals is likely. Under the best circumstances, the number of deficiencies is small and water penetration is not widespread. Field surveys and tests of buildings that rely solely on single exterior joint seals for watertightness have found significant leakage problems when less than one percent of the sealant joint length contains defects; this does not allow for much variability in sealant joint materials and construction.

Designers can improve the performance of joint seals in several ways. Shingling or overlapping the wall components at joints, recessing the seals and windows from the face of the wall, sloping horizontal surfaces outward slightly, and providing overhangs and drip edges reduce the exposure of joints (and joint defects) to rainwater and sunlight. But these features often do not provide substantial protection against wind-driven rain.

Constructing an inner seal behind the exterior surface seal and weeping the cavity between the two provides some redundancy and may be designed to exploit pressure-equalization or "rain screen" principles [P/A, Aug. 1990, pp. 47–52]. The inner seal of this two-stage system lies inboard of shallow voids or cracks in the substrate and is protected from the elements. The inner seal in vertical joints must turn out at frequent intervals to direct water through weep holes in the outer seal. Generally, joint widths need to be about ¾" (at minimum) to allow construction of the inner seal from the exterior (exterior installation avoids interference from interior obstructions such


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Defects in sealant joints are a major cause of water leakage in barrier systems, especially where there is a change in materials:

7 *1970s era sealant subject to large joint movement from metal cover on left has hardened with age and has split.*

8 *Sealant debonded from hollow end of window sill extrusion; 1/16" thickness of extrusion is not sufficient for sealant adhesion.*

9 *Severe weathering degradation of a joint sealant.*

10 *Fine cracking along the edge of a precast concrete panel extends deeper than the sealant.*

as columns) and integration of the inner seal with the exterior seal at weep holes.

An outward slope or a step-up in the top edge of the cladding panel at horizontal joints improves performance, but water can still penetrate where the vertical panel joints interrupt the continuity of the panel's top edge. A more reliable and durable approach incorporates continuous through-wall flashing in the horizontal joints at the base of single or two-stage vertical joints at each floor. This avoids problem-prone weep hole details in the two-stage approach and reduces reliance on the sealants for watertightness.

Wall Openings

Wall openings interrupt the façade and the flow of water within the cladding system. Flashing should be provided above the head of windows in cavity wall construction to collect water draining down the cavity from above. Window head flashing improves the performance of all barrier walls and is essential for systems that absorb and retain some water within the cladding, such as multi-wythe brick masonry.

In some cavity wall systems, water can leak through the sides or jambs of the opening where the back-up waterproofing layer terminates. Window jambs are particularly vulnerable in brick veneer systems when the brick forms a 90° corner at the jambs. The return edge of the brick may reduce the width of the cavity, and mortar droppings in this area may direct water toward the jamb. Reconfiguring the brick masonry can reduce the risk of leakage, but installing a jamb flashing to connect the back-up waterproofing layer to the window frame is the most dependable approach.

Elements within wall openings, such as windows and louvers, can leak water into the interior. Despite laboratory test reports that certify window performance under adverse conditions, in-service leakage is possible [P/A, Aug. 1991, pp. 125–128]. The most vulnerable component is the joint seal between the horizontal and vertical framing members (frame corner seals). Most frame extrusions contain complex geometries and differing materials, such as screw bosses, gaskets, offsets, and thermal breaks, that can disrupt continuity in the application of the corner seals. Liquid-applied seals debond after long-term exposure to ponding water. Some plastic thermal breaks shrink. Handling and installation of the window frame and in-service operation of large sash can break frame corner seals.

Some window styles, such as horizontal sliders, are more prone to corner seal leakage than others. The weatherstripping seals on sliding joints tend to allow more water entry into the horizontal slider system, especially as the weatherstripping deteriorates from use, than do seals on double hung and other styles of operable windows. The sills of many operable units collect water, as gutters do, thereby increasing the exposure of the corner joint seals to water; additional precautions are necessary, therefore, to control leakage through the window frame corner seals.

Recessing windows from the face of the building reduces exposure to water flowing down the outside wall. Positioning window frames in cavity walls so

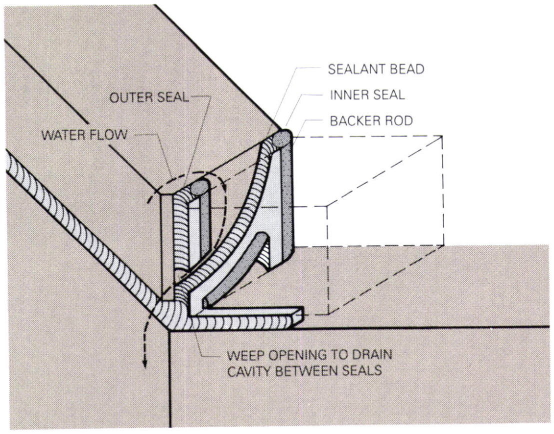
Window Testing Programs

Testing the resistance of windows to water penetration can help establish minimum performance levels for contract specifications. However, some designers inappropriately interpret success in these laboratory tests as a basis for omitting back-up features, such as sill flashings, because they fail to consider the following two key factors.

1 Generally, a single carefully prepared (and sometimes repaired) window unit is tested, and it may not represent the quality of production units.

2 The tests typically do not include auxiliary window perimeter components (such as receptors or panning) and the window perimeter sealant joint.

While AAMA's *Window Selection Guide* states that "Good flashing is essential to good performance," most window manufacturers have not promoted sill flashings, perhaps to avoid appearing uncompetitive. Designers need to consider not only the performance of the window unit, but also its integration with the surrounding wall system.



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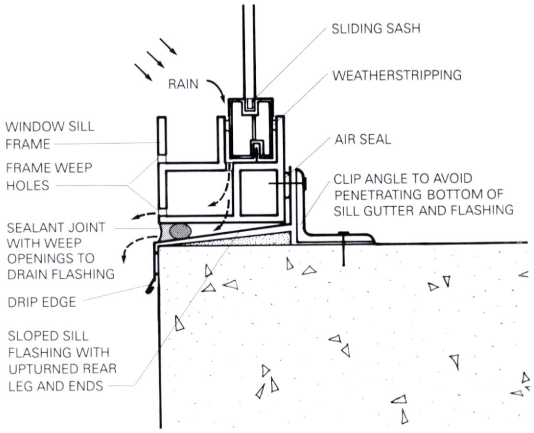

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14

11 *Two-stage vertical sealant joints provide a second line of defense against horizontal water intrusion, but the performance of the assembly depends on the inner seal's being shaped to re-route water back outdoors through a break (weep hole) in the outer sealant bead and backer rod.*

Defects in the corners of windows are a common cause of water entry:

12 *Schematic section of window sill flashing shows desirable installation.*

13 *Thickness gage slid through defective frame corner seal on a horizontal sliding window reveals an opportunity for water leakage.*

14 *Before repair, on left, the window sill cap butted against the brick wall and did not cover sill bricks. Remedial flashing system, partially installed on right, included lead-coated copper sill flashing with upturned edges behind and beyond window. Jamb flashing, not yet sealed to concrete block back-up wall, will close off the end of the wall cavity between the concrete block and the window jamb.*

that any leakage through the frame corner flows into the wall cavity can help mitigate corner leakage, but this risks inadvertent transmission of water to the back-up wall at wood blocking or anchorages. The most reliable and durable means to waterproof windows is to install a flashing (such as a sheet metal pan) along the bottom of the opening or the window sill, to collect leakage through the window frame joints and direct it back to the outside [P/A, June 1990, pp. 41–43].

Internal Collection/Drainage Elements

Proper design and construction of internal collection and drainage devices is vital to cavity wall systems. The durability of the materials and the methods of maintaining continuity of such devices are of primary concern. Metal-framed curtain walls incorporate a gutter in the horizontal extrusions to collect water that leaks into the system and to direct the water back to the exterior through weep holes. This drainage gutter has problems similar to those noted above for window construction – primarily the vulnerability of the frame corner seals at the intersection of the horizontal (gutter) section and the vertical mullions. Simplifying the geometry of the frame corner intersections, constructing the corner seals in the factory, and constructing glazing seals with sealant ("wet-sealing") rather than rubber gaskets can improve system performance. Nevertheless, the service life of most gutter corner seals is less than that expected for the rest of the wall assembly, and most systems lack a reliable means for replacing the seals when they deteriorate. Despite this weakness, metal-framed curtain walls with gutter drainage generally perform better than barrier walls, because of their secondary drainage capability.

In theory, the drained cavity wall system provides much greater protection against leakage than do barrier wall systems. In practice, however, cavity walls depend critically on properly designed and installed through-wall flashings. During the inception of brick veneer/steel stud walls in the 1970s, leakage problems were common and were almost always attributed in significant part to improper design or installation of the wall cavity waterproofing and through-wall flashing system. Flashing performance varies according to the flashing materials, terminations, and joint construction.

Some flashing materials, such as lightweight copper fabric (less than 5 oz.) and thin, unreinforced polyvinyl chloride (PVC; 10 to 30 mils), are readily punctured and torn during construction. Some PVC flashings also embrittle and crack with loss of plasticizers (added during manufacture to soften this normally rigid plastic). Mechanical stress – for example, where the flashing is stretched over an offset or where mortar has accumulated on the flashing – accelerates embrittlement.

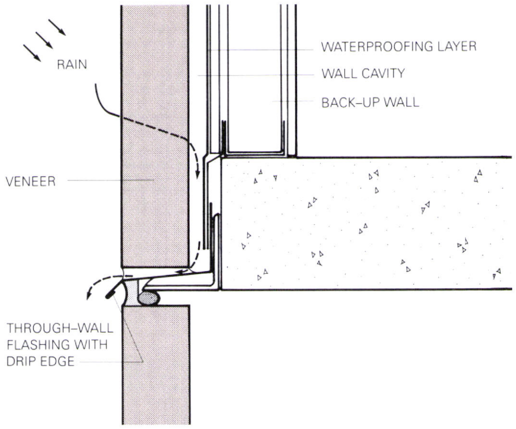
Several flashing materials are damaged by sunlight or are not stiff enough to form exposed drip edges. As water drains out of the wall cavity, it can run back underneath the flashing if the flashing terminates behind the face of the veneer. Fully adhering the flashing to some substrates can help prevent water from running underneath it and can improve performance. Extending the flashing through the

Drip Edges on Flashings

Technical Notes published by the Brick Institute of America (BIA) in the 1960s and 1970s suggested the use of drip edges on through-wall flashings in brick masonry walls, but noted that some designers preferred to conceal the front edge of the flashing for aesthetic reasons.

Over time, many buildings with flashings that terminated behind the face of the cladding experienced water leakage. Updates to BIA *Technical Note* 7 in 1985 painted a different picture of the importance of a drip edge on flashings in brick curtain walls: "All flashing should extend beyond the face of the wall to form a drip. Termination of through-wall flashing behind the exterior face of the wall is a dangerous practice and is not recommended."

Despite such warnings, some designers still underestimate the leakage from water flowing off the concealed front edge of the flashing and returning underneath it, and they continue to specify flashing materials (such as PVC roll flashing) that cannot be exposed or formed into a drip edge.



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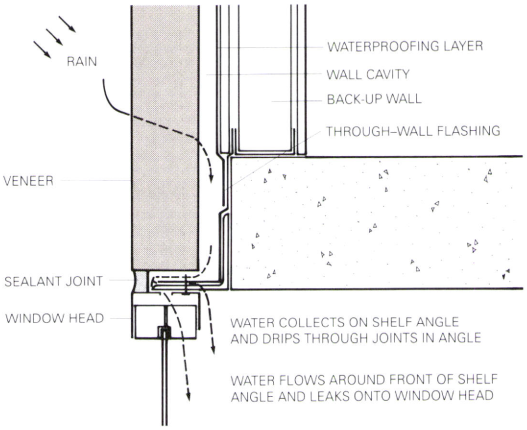

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Drawings: Evan L. Goldenberg

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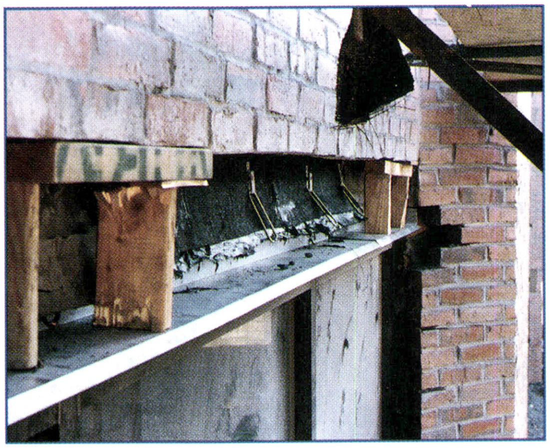

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All details of flashing are important. One of the most common mistakes is trying to conceal the discharge end of through-wall flashings:

15 *Through-wall flashings should have exposed drip edges, to discharge water free of the wall and to prevent it from re-entering the assembly.*

16 *Concealed flashings may simply reroute water within the wall, rather than discharging it.*

17 *Front edge of PVC flashing on a steel lintel resulted in damage concealed behind a mortar joint requiring expensive repairs.*

18 *Remedial lead-coated copper flashing being installed with an exposed drip edge to replace an ineffective concealed flashing. Copper fabric laps over the upturned rear leg of the flashing.*

wall and creating an exposed drip edge is the most dependable termination, since the drip edge is a permanent feature and its performance does not rely on continuity of the substrate or continuity of adhesion.

A key difference to consider when selecting flashing materials is the method of sealing the transverse joints and corners to make them permanently watertight. The joint seals must withstand any flashing movement and must be as durable as the wall system and the flashing material itself. Mastics and sealants used with many systems – such as PVC, copper fabric, and aluminum – are prone to degrade and lose adhesion after prolonged exposure to water. Aluminum flashing with lapped joints bedded in sealant tends to tear the seals apart as the flashing expands and contracts with temperature changes. Other more reliable methods of sealing aluminum flashing joints are available, but generally at greater initial cost. Soldering provides the most durable joint construction, and, therefore, limits the flashing materials we prefer to copper, lead-coated copper, and stainless steel. Through-wall flashings that rely on soldered joints and connections provide the most durable collection and drainage systems, and avoid the problems associated with frame corner seals on gutter-type systems.

Conclusions

The components for maintaining watertightness of exterior walls need to be reliable and durable, since they are difficult, disruptive, and costly to repair or replace. Watertight systems should have the following features and characteristics:

- a wall cavity and waterproofed back-up wall behind the veneer cladding material,
- limited reliance on single lines of exterior joint seals,
- flashings above and below set-back windows and wall openings
- solderable sheet metal, through-wall flashings with exposed drip edges at each floor.

Above all, designers should always keep in mind the high cost of repair when evaluating the appropriateness of materials or systems with lower initial costs.

James C. Myers, PE and **Stephen S. Ruggiero, PE** ■

Recommended Reading

"Design and Construction of Watertight Exterior Building Walls," S.S. Ruggiero and J.C. Myers, *Water in Exterior Building Walls: Problems and Solutions*, STP 1107, T.A. Schwartz, editor, ASTM, Philadelphia (215) 299-5585, publication expected in January 1992.

"Window Sill Flashings: The Why and How," J.C. Myers, P/A, June, 1990, pp. 41–43.

Voluntary Specifications for Aluminum Prime Windows and Sliding Glass Doors, ANSI/AAMA 101-88, American Architectural Manufacturers Association, Des Plaines, Illinois (708) 202-1350.

Window Selection Guide, American Architectural Manufacturers Association, Des Plaines, Illinois (708) 202-1350, 1988, 58 pp.

Technical Notes on Brick Construction (particularly series 7, 21, and 28), Brick Institute of America, Reston, Virginia (703) 620-0010.

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Exterior Wall Sealant Joint Design

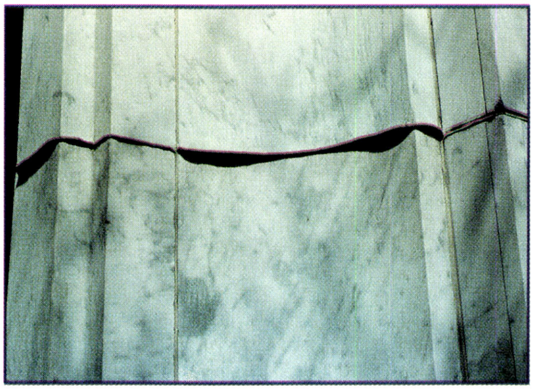
Architect **Thomas F. O'Connor** of Smith Hinchman & Grylls Associates provides a step-by-step analysis and example of how to size sealant joints.

Architects, for aesthetic reasons, try to limit the width of sealant joints on the walls of buildings. While a designer may say, "I want to see a ¼" wide joint," analysis of the behavior of the joint is necessary to determine if ¼" will be adequate. Joints can and do fail (1, 2) if thermal movement, construction tolerances, reversible and irreversible growth or shrinkage of materials, and structural effects such as dead load and live load deflection, creep, and elastic frame shortening are not considered in the design of the joint. Failure of joints can cause increased building energy use, water infiltration, and deterioration of building systems and materials.

Basic Joint Movements

Butt-type sealant joints experience four basic types of movement (3). Thermally induced movement is usually the largest contributor, but other movements are also involved. The temperature at the time of sealant installation determines seasonal stresses: Sealants installed during cool or cold months are compressed during warm months, when thermal expansion of the cladding narrows joint openings. Conversely, sealants installed during summer are extended during winter, when the abutting claddings contract and widen joints. Both compression and extension of a sealant occur when it is installed between the design temperature extremes (during fall or spring); this results in compression during summer and extension during winter.

Longitudinal extension of sealants typically occurs when the sides of the joint are formed by different materials or systems – for example, brick masonry on one side and an aluminum curtain wall mullion on the other. These materials respond differently to temperature change (the brick will change dimension less than the aluminum), causing a diagonal lengthening of the sealant (4). Longitudinal and transverse movement depend on each material's anchorage conditions and the unrestrained length of the respective materials. Longitudinal movement usually peaks along some part of the length of the sealant joint. Transverse extension of a sealant, in contrast, typically occurs at corners and other changes in plane. As the materials forming the sides of the joint move, a diagonal extension of the sealant occurs crosswise to the plane of the sealant joint face.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Joints frequently accommodate more than one movement. Examples include the previously described extension with compression, as well as extension and/or compression combined with longitudinal or transverse extension. The architect should evaluate the types of movement the joint will experience and should design accordingly.

Performance Factors

The behavior of the joint is governed by the physical properties of the cladding, the nature of its anchorage to the building frame, ambient temperature, solar exposure, deflections caused by loading, and other factors. The long-term performance of the joint depends on how well the architect understands these factors and can respond to them in design.

Material Anchorage. The type and location of anchors establish wall material (or panel) length and may determine deflection characteristics that must be accounted for in the joint design. Brick masonry relieving angle deflection and curtain wall fixed and moving anchorages are examples of conditions to be evaluated when designing sealant joints (these and other conditions are described in Rainger's book *Movement Control in the Fabric of Buildings*).

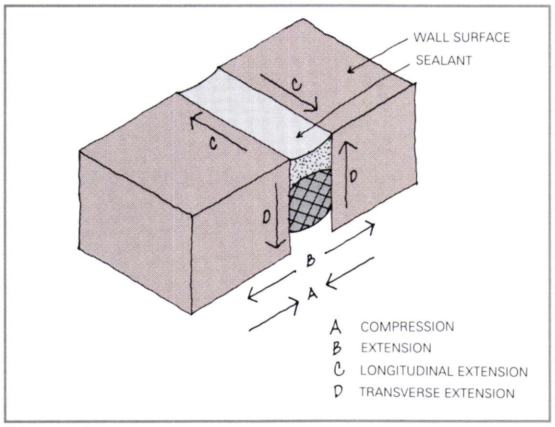
Thermal Movement. Building walls expand and contract in response to ambient temperature and solar radiation cycling, and it is important to have realistic climatic data for design. The ASHRAE *Fundamentals Handbook* lists winter and summer design dry-bulb air temperatures for many cities in the U.S. and Canada. The winter wall surface temperature T_{win} is established by the 99 percent (winter) design dry-bulb air temperature. This is the temperature that is


2

Automated Calculations

Calculation of joint widths can be time consuming. The author has eliminated a substantial amount of time as well as potential error by utilizing a Sharp™ Model OZ-8000 electronic organizer with the optional Money Planner IC Card. Tabular information such as thermal movement, solar absorptivity, reversible and irreversible movement coefficients, and other operational information has been entered into the organizer's outline processor as reference files. The optional Money Planner IC card will accept mathematical equations developed by the user. Equations for basic joint movements as well as various combinations have been developed and entered. To calculate a joint width, call up the appropriate equation, which presents a list of variables to enter, push the solve key, and it will display the answer in the wink of an eye. The benefits from using the organizer are accuracy, speed, and portability.

1 *Sealant joint after movement showing compressive failure of the sealant caused by inadequate joint width.*
2 *Sealant joint after movement showing primarily adhesive failure of the sealant.*



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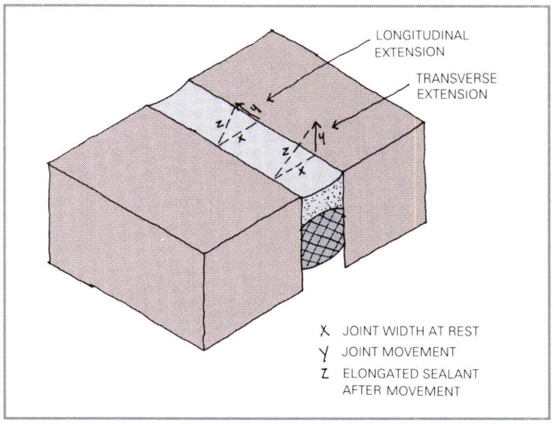

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3 *Types of sealant joint movements.*
4 *Elongation of the sealant caused by longitudinal and transverse extensions of the joint is calculated by the following trigonometric relation:*

$$x^2 + y^2 = z^2$$
$$x^2 + y^2 = [(1 + B)x]^2$$

where

$$z = (1 + B)x$$

B = *movement capacity of sealant expressed as a decimal.*

exceeded by 99 percent of all hours during the months of December, January, and February; in a normal winter, there are approximately 22 hours at or below the 99 percent design temperature.

Summer wall surface temperature T_{sum} is the sum of the 1 percent (summer) design dry-bulb air temperature T_{air} and the solar radiative heat gain αH, where the 1 percent design temperature is the value that is equalled or exceeded by 1 percent of the total hours during the months of June through September (29 hours):

$$T_{\text{sum}} = T_{\text{air}} + \alpha\text{H}. \qquad [1]$$

The temperature elevation factor H takes into account both the heat capacity and the solar exposure of the wall, while the solar absorption coefficient α is mostly related to surface color. Use the following values for H:

- 100 for low heat capacity materials, such as well insulated curtain wall materials;
- 75 for high heat capacity materials, such as precast concrete and brick masonry;
- 130 when solar radiation is reflected on low heat capacity materials by adjacent, light-colored or otherwise reflective surfaces;
- 100 when solar radiation is reflected on high heat capacity materials by adjacent, light-colored or otherwise reflective surfaces.

Equation 1 is for east, west, and south walls receiving direct solar radiation. Sealant joint widths are usually based on the worst exposure – with that width repeated for other building exposures – so the summer surface temperature of north walls does not usually need to be considered in North America. The solar absorption coefficient α ranges from 0.15 for glass to 0.95 for black finishes (5). Although clean, bright white surfaces may absorb as little as 10 percent of the incident solar radiation, few surfaces stay clean so as to justify such a low value. Using Equation 1 and ASHRAE *Fundamentals* is a convenient way of estimating wall surface temperatures, but the architect must use judgment in establishing these values, based on past experience and an understanding of the wall construction.

The linear coefficient of thermal movement ϵ of the wall material must also be determined. The ASTM *Guide for Use of Elastomeric Joint Sealants* includes a table that lists coefficients for many construction materials [a short table of values is contained in "Joints in Construction," P/A, February 1990, p. 47]. For composite construction, an appropriate coefficient of thermal movement must be determined for the overall assembly. The amount of thermally induced movement L_{thr} (in) for a given length of material L (ft) is that length times the coefficient ϵ times the temperature range ΔT over which the movement occurs:

$$L_{\text{thr}} = \epsilon L(\Delta T). \qquad [2]$$

The coefficient of thermal movement ϵ may be expressed as a ratio of inches of movement per foot or inches of length per degree temperature change, depending on the source. When ϵ is given in inches/inch, and L in feet, L must be multiplied by 12 to convert it into inches.

Moisture-Induced Movement. Reversible changes in sealant joint width are usually caused by thermal movements; some materials, however, increase in dimension with high water content and decrease with low water content. Materials susceptible to reversible swelling and shrinking include some natural building stones, concrete, face brick, and concrete block. Some materials also change dimension irreversibly (brick and concrete, for example). The addition of reversible moisture-induced movement to thermal movement may not be a truly additive effect. Moisture content tends to decrease with a rise in wall surface temperature and to increase with a drop in wall surface temperature. While this produces movements that are somewhat compensating, they may not necessarily occur simultaneously. The net sealant joint movement caused by thermal and reversible moisture effects may be difficult or impossible to determine, so judgment must be used when reversible moisture induced movement is considered.

Some materials are well known to exhibit reversible movement (M_{rev}), and irreversible movement (M_{irr}). Reversible movement is based on the likely extremes of in-service moisture content and irreversible movement throughout the period from manufacture to maturity. Steel reinforcement will usually lessen the concrete values given here (6). In general, cement-based products shrink and fired clay products expand irreversibly as they equilibrate with the environment after manufacture.

Construction Tolerances. Industry and professional associations establish material and construction tol-

Movements from Loads

Apart from the "architectural" performance factors discussed in the text and figured in the example, both short-term and long-term structural loading can cause cladding movements at joints. These should be discussed with the project structural engineer, who can provide estimates of movement.

Live Load Movement. Differential live load deflection between floors should be considered in the design of horizontal joints. For example, a multistory building will probably have the same design live load for adjacent floors, but the actual live load is likely to vary from floor to floor and from one area of a floor to another. Rarely will the live load be uniform everywhere.

Live load deflection usually occurs after the joint has been sealed and it irreversibly narrows the joint opening. This irreversible narrowing must be considered as a movement in the design of the joint opening.

Dead Load Movement. Dead load deflection irreversibly narrows horizontal joints for most applications. Deflection usually occurs before the joint is sealed, although some may occur afterward, for instance, when fixed equipment is installed. The latter deflection must be considered a movement, while the former must be accounted for in sizing the joint for the sealant's working properties.

Wind Load Movement. Depending on building type, framing system, and anticipated wind load, lateral drift from floor to floor may have to be considered. Lateral drift can occur both normal to and in the plane of the wall, producing movement that affects horizontal sealant joints.

(continued on p. 123)

5 SOLAR ABSORPTIVITY COEFFICIENTS

MATERIAL	COEFFICIENT	MATERIAL	COEFFICIENT
Aluminum, clear finish	0.60	Galvanized steel, white finish	0.26
Aluminum paint	0.40	Glass, clear, 6mm (1/4")	0.15
Mineral board, uncolored	0.75	Glass, tinted, 6mm (1/4")	0.48–0.53
Mineral board, white	0.61	Glass, reflective, 6mm (1/4")	0.60–0.83
Brick, light buff (yellow)	0.50–0.70	Marble, white	0.58
Brick, red	0.65–0.85	Surface color, black	0.95
Brick, white	0.25–0.50	Surface color, dark gray	0.80
Concrete, uncolored	0.65	Surface color, light gray	0.65
Copper, tarnished	0.80	Surface color, white	0.45
Copper, patina	0.65	Tinned surface	0.05
Galvanized steel, unfinished	0.90	Wood, smooth	0.78

6 MOISTURE-INDUCED MOVEMENT COEFFICIENTS

MATERIAL	MOVEMENT (PERCENT)	
	Reversible	Irreversible
	M_{rev}	M_{irr}
Concrete, gravel aggregate	0.02–0.06	0.03–0.08 (–)
Concrete, limestone aggregate	0.02–0.03	0.03–0.04 (–)
Concrete, lightweight aggregate	0.03–0.06	0.03–0.09 (–)
Concrete block, dense aggregate	0.02–0.04	0.02–0.06 (–)
Concrete block, lightweight aggr.	0.03–0.06	0.02–0.06 (–)
Face brick, clay	0.02	0.02–0.09 (+)
Limestone	0.01	NA
Sandstone	0.07	NA

(–) indicates a reduction, (+) an increase in dimension, and NA not available.

erance standards. For some materials and systems, there are no industry-recognized tolerances, or those available are not directly applicable to joint design. In these instances, conditions should be evaluated and realistic tolerances established by the architect for the work so that sealant performance isn't compromised, especially by joint openings that are too small [see P/A, 8/91, pp. 125–128]. Tolerances should be indicated on the contract documents, since they establish a level of quality and may affect the cost and performance of the work.

Material Tolerances. Dimensional variation (manufacturing tolerances) of materials may have to be included as a factor in sealant joint design. Construction materials have permissible variations for the exactness of their dimensions. For example, a face brick that is nominally 2¼" x 8" x 3½" thick may have – depending on the type of brick – permissible manufacturing tolerances (ASTM C 216) as much as ± 3/32" to ± 1/4" for an 8" dimension.

Fabrication Tolerances. Factory-fabricated assemblies can usually be built to smaller tolerances than job-site fabrication. For example, factory-fabricated curtain wall or window frames may permit ± 1/16" tolerance on the length and width of the frames, while job-site assembly of a face brick wall may permit no better than ± 1/4" tolerance for the width of an expansion joint opening.

Erection Tolerances. Wall materials or systems cannot always be placed on a building exactly where called for by the contract documents. Location tolerances should be allowed for, to avoid deficient joint opening widths. For example, a unitized curtain wall frame may be erected no closer than ± 1/8" to indicated height or lateral locations, and this affects the joint opening width between frames.

Case Study Calculation

Different cladding materials and systems abut, and the interface is often a vertical sealant joint subject to combinations of movements and differing tolerances of construction. A single case study can exemplify most of the "architectural" factors (loading deflections and frame shortening effects are not included here) discussed above.

For a building in Detroit, the architect has designed a masonry wall of red, extruded brick (having little dimensional variation) with expansion joints at 24' maximum spacing. The masonry wall terminates at a clear-anodized aluminum and glass curtain wall. Both walls are 16' high, separated by a sealant joint. They are supported at the bottom on a foundation wall; the maximum vertical movement, therefore, occurs at the top of the walls. No masonry construction is expected to be done below 40 F and the joint width would be built at a maximum of about 95 F in the summer. The masonry wall will be erected before the curtain wall; the curtain wall could be erected at any temperature, from a low of about 10 F to a high of about 95 F. The expected construction tolerances for the joint opening are ± 3/16" for the location of the end of the brick wall, C_{brk}. The curtain wall will be erected in the field as a stick system to ± 1/8" for exactness of location of the vertical mullions, C_{alm}. Performance factor values are listed in the sidebar, including data sources.

The sealant joint experiences vertical and horizontal movement. The horizontal component causes compression and extension of the joint, while the vertical component causes longitudinal extension. For this example, the horizontal component from the curtain wall is accommodated within the curtain wall system, while that from the brick masonry is accommodated by the sealant joint. The vertical component is primarily the differential increase or decrease in height of the two systems.

Thermal Movement. The solar absorptivity α for the brick is not known; to be conservative, the high end – 0.85 – of the possible range (5) is used. The summer wall surface temperature T_{sum} is found by Equation 1, using $H = 75$ for a high heat capacity material:

$$\begin{aligned} T_{sum} &= T_{air} + 75\alpha \\ &= 91 + 75(0.85) \\ &= 155 \text{ F.} \end{aligned}$$

The winter wall surface temperature T_{win} is 3 F. The maximum expected temperature difference ΔT is found by Equation 3:

$$\begin{aligned} \Delta T &= T_{sum} - T_{win} \qquad [3] \\ &= 155 - 3 \\ &= 152 \text{ F.} \end{aligned}$$

If the installation temperature T_{ins} cannot be reliably established, the above values would be used. Since T_{ins} is known, then ΔT is found using Equations 4 and 5 (design and operating temperature ranges are diagrammed in 7):

(continued from p. 122)

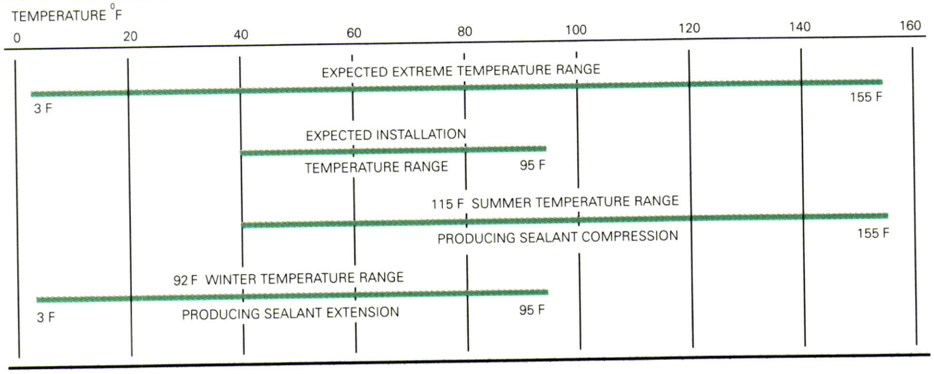
Elastic Frame Shortening. Multistory concrete – and to a lesser degree, steel – structures shorten elastically almost immediately on application of loads. Frame shortening irreversibly narrows horizontal joint openings in multistory construction. Frame shortening can be compensated for by constructing each floor slightly higher, or the narrowing effect can become a performance factor in the design of the sealant joint.

Creep. The time-dependent deformation of materials, especially concrete, should be considered. This deformation can cause a continuing decrease in the width of horizontal joints. Creep, in contrast to elastic frame shortening, occurs over a long period of time.

Shrinkage. Concrete frame structures shrink for a period of months as the concrete dries. The rate of shrinkage depends on many interrelated factors, including the amount of water in the mix, ambient temperature, air movement, ambient relative humidity, and the shape and size of the concrete section. Generalized shrinkage values (6) can be used for joint design. Shrinkage should either be allowed for in the joint design or compensated for in the formwork.

Overall effects. It is difficult to predict the percentage of the above building frame effects (as well as some performance factors) that will occur before the joint is sealed; it has been reported that about 40 to 70 percent of the total axial shortening, including creep, will take place before the joint is sealed. A structural engineer can determine values for the above performance factors with respect to the framing system of the building.

7 EFFECT OF INSTALLATION TEMPERATURE ON BRICK THERMAL MOVEMENT



Case Study Parameters

- Height of masonry wall: 16'
- Height of curtain wall: 16'
- Masonry wall expansion joint spacing: 24'
- Construction tolerances:
  brick: $C_{brk} = \pm \frac{3}{16}$"
  aluminum: $C_{alm} = \pm \frac{1}{8}$"
- Design air temperature (ASHRAE *Fundamentals*):
  winter T_{win} = 3 F
  summer T_{air} = 91 F
- Installation temperature:
  Brick T_{ins} = 40 F minimum, 95 F maximum
  Aluminum T_{ins} = 10 F minimum, 95 F maximum
- Solar absorptivity (5):
  brick: α_{brk} = 0.65–0.85
  aluminum: α_{alm} = 0.60
- Moisture-induced movement (6):
  brick M_{irr} = + 0.0002 to + 0.0009 in/in
- Thermal movement coefficient (ASTM C 1193):
  brick: ϵ_{brk} = 0.0000036 in/(in)F
  aluminum: ϵ_{alm} = 0.0000132 in/(in)F

Summer:

$$\begin{aligned}\Delta T &= T_{sum} - T_{ins} \\ &= 155 - 40 \\ &= 115 \text{ F.}\end{aligned} \qquad [4]$$

Winter:

$$\begin{aligned}\Delta T &= T_{ins} - T_{win} \\ &= 95 - 3 \\ &= 92 \text{ F.}\end{aligned} \qquad [5]$$

The largest difference, which is ΔT = 115 F, should be used for joint design. The (vertical) masonry wall expansion joints are spaced at 24'; one-half of that length (in this case) contributes to horizontal movement of the joint. Horizontal thermal movement of the brick is found by Equation 2:

$$\begin{aligned}L_{thr} &= \epsilon L(\Delta T), \\ L_{thr} &= (0.0000036)12'(12''/')(115 \text{ F}) \\ &= 0.0596''.\end{aligned}$$

Some masonry consultants (Grimm in "Thermal Strain in Brick Masonry," for example) indicate that the thermal expansion of extruded face brick in a vertical direction (the direction of the coring) is perhaps 22 percent greater than in the horizontal. Until independent testing provides more certain values, it seems prudent to include that increase in the vertical movement calculation, using Equation 2:

$$\begin{aligned}L_{thr} &= \epsilon L(\Delta T) \\ L_{thr} &= (0.0000036)16'(12''/')1.22(115 \text{ F}) \\ &= 0.0970''.\end{aligned}$$

The expected vertical thermal movement of the aluminum mullion is found as follows. The surface temperature extremes are T_{win} = 3 F and by Equation 1, using a constant for a low heat capacity material, T_{sum} = 151 F. By Equations 4 and 5, ΔT = 141 F or 92 F. Thermal movement is found by Equation 2 using the largest difference:

$$\begin{aligned}L_{thr} &= \epsilon L(\Delta T) \\ L_{thr} &= (0.0000132)16'(12''/')141 \text{ F} \\ &= 0.3574''.\end{aligned}$$

Moisture-Induced Movement. Reversible moisture-induced movement M_{rev} is based on moisture content measurements made from extremely wet (but not submerged) to extremely dry external exposures. A review of the technical data for this particular brick indicates low water absorption. Since neither an extremely wet nor dry exposure is expected, reversible moisture growth should be negligible and will not be considered.

For irreversible moisture growth M_{irr}, a range of values is indicated (6). If specific data for a particular brick is unavailable, it is advisable to use the upper end of the range of values or (for this case study) the ACI-recommended value of 0.0003 for design. Irreversible moisture movement L_{moi} is determined by Equation 6:

$$L_{moi} = (M_{irr})(L). \qquad [6]$$

Substituting in values for horizontal movement:

$$\begin{aligned}L_{moi} &= (0.0003)(12')(12''/') \\ &= 0.0432''.\end{aligned}$$

Subsituting in values for vertical movement:

$$\begin{aligned}L_{moi} &= (0.0003)(16')(12''/') \\ &= 0.0576''.\end{aligned}$$

These expected joint movements account for temperature change and irreversible moisture-related growth of the brick cladding.

Sealant Movement Capacity. Once the extent of movement at the joint is determined, the width of the joint can be calculated for different types of sealant materials. Permanent narrowing effects from material, construction, and erection tolerances are added to that width to arrive at the design width for the joint opening.

For this case study, the architect selects a sealant with a ± 50 percent movement capacity. The author believes it is not prudent to use a sealant at its rated movement capacity: Doing so provides no buffer against unknowns and no allowance for inaccuracies in establishing surface temperature and other performance factors. This approach, to the author's knowledge, is not followed by most sealant manufacturers and other joint designers. The percent by which the sealant's movement capacity should be reduced (a kind of design factor) depends on evaluation of each particular joint design. For this example, considering the abutting of work by different trades and the irregularities of brickwork, using the sealant at ± 40 percent seems appropriate.

Horizontal Joint Width Component. The required joint width W_{hor} to satisfy horizontal movement criteria is found by Equation 7, in which B represents the sealant movement capacity percentage (expressed as a decimal):

$$W_{hor} = (L_{thr} + L_{moi})/B \qquad [7]$$

$$W_{hor} = (0.0596 + 0.0432)/0.40 = 0.2570''.$$

Vertical Joint Width Component. In addition to horizontal compression and/or extension, the joint width must enable the sealant to accommodate the vertical component of thermal movement and irreversible face brick growth, both of which cause a shearing effect within the sealant. Vertical thermal movement for this example is the differential or net movement between the materials that form the joint sides (aluminum at 0.3574" and brick at 0.0970"):

$$0.3574'' - 0.0970'' = 0.2604''.$$

To this value is added the expected irreversible face brick growth of 0.0576". Although this is not a reversible movement, it causes a diagonal lengthening of the sealant with time. The expected total vertical joint movement y is:

$$y = 0.2604'' + 0.0576'' = 0.3180''.$$

To not exceed the ± 40 percent capacity of the sealant, the diagonal length of the sealant after movement must not be greater than the installed joint width at rest plus 40 percent of that width. A simple trigonometric relation (4) provides the required joint width to accommodate vertical movement: If x represents the sealant joint installed width, y represents the vertical movement (longitudinal extension), and 1.4 is the diagonal sealant length after movement (allowing $B = 0.4$), the required joint width for vertical movement is found using Equation 8:

$$W_{\text{ver}} = x \qquad [8]$$

where

$$x^2 + y^2 = (1.4x)^2,$$
$$x = (y^2/0.96)^{1/2},$$

and substituting 0.3180" vertical movement found above for y:

$$\begin{aligned}(W_{\text{ver}}) &= [(0.3180)^2/0.96]^{1/2}\\ &= 0.3246''.\end{aligned}$$

The design width W of the sealant joint is determined using Equation 9:

$$W = W_{\text{ver}} + W_{\text{hor}} + C_{\text{alm}} + C_{\text{brk}}. \qquad [9]$$

Substituting in the values obtained above,

$$\begin{aligned}W &= 0.3246'' + 0.2570'' + 0.125'' + 0.1875''\\ &= 0.8941''\\ &\approx \tfrac{7}{8}''.\end{aligned}$$

The contract documents should indicate the final design joint width with the permissible construction tolerance as " ⅞" (± 5⁄16")."

The guidelines for sealant depth and profile given in the ASTM *Guide for Use of Joint Sealants* should be followed. In general, depth should be one-half the width, but it should never be less than ¼" nor more than ⅜" to ½" at the sealant/substrate interface. Also, the width of a sealant joint should never be less than ¼" and generally it should not exceed 2" (this may vary with the sealant type and the manufacturer's recommendations).

Conclusion

The architect must evaluate sealant joints qualitatively and quantitatively for performance factors and types of movement to be accommodated. Designers should also consider using the sealant at a value less than its rated capacity; this provides a "design factor" that allows for uncertainties in establishing material properties, climatic variables, and tolerances. The architect, by designing sealant joints using these simple mathematical approximations, can preclude many of the typical failures that lessen building durability.

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Nomenclature

α	Solar absorptivity coefficient (dimensionless)
B	Sealant design movement capacity (a percentage of its rated capacity)
ΔT	Cladding thermal movement temperature range (F).
ϵ	Cladding thermal movement coefficient (in/(in)F).
C	Cladding panel construction tolerance (in)
H	Temperature elevation factor of cladding due to heat capacity and solar exposure (F)
L	Joint spacing or length of cladding panel (ft)
L_{thr}	Change in joint dimension due to thermal movement of cladding (in)
L_{moi}	Change in joint dimension due to moisture-induced movement of cladding (in)
M_{irr}	Coefficient of irreversible moisture-induced movement of cladding (in/in)
M_{rev}	Coefficient of reversible moisture-induced movement of cladding (in/in)
T_{air}	Design dry-bulb summer air temperature (F)
T_{ins}	Cladding temperature at time of sealant installation (F)
T_{sum}	Cladding surface summer design temperature (F)
T_{win}	Cladding surface winter design temperature (F)
W	Design width of sealant joint (in)
W_{hor}	Joint width to accommodate horizontal movement (in)
W_{ver}	Joint width to accommodate vertical movement (in)
x	Sealant joint installation width (in); see 4
y	Longitudinal (or transverse) extension of sealant joint (in); see 4
z	Diagonal elongation of sealant due to longitudinal or transverse extension of joint (in); see 4

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THE DESIGNERS PALETTE

Anchored Thin Stone Veneer Systems

Architect **George L. Maness** and stone expert **Ava Shypula**

outline tests and material considerations for selecting and evaluating thin stone claddings.

In adapting the use of stone from load-bearing to curtain wall construction, architects have seen their design tasks grow more complex. Indeed, architects today can design with greater flexibility, choosing from abundant varieties of stone and employing innovative thin (2" or less) stone veneer cladding systems. But with more freedom has come added responsibility: As thin stone veneer systems become entrenched in today's design vocabulary, architects must scrutinize more closely the properties of the veneer materials they select, specify, and use, and they must comprehend the various methods of anchoring veneers to the back-up system.

Design Considerations

Building stones are products of nature; their physical properties vary widely within types and they even differ within a quarry. These varying properties restrict the effective use of stone, particularly as the thickness of the slab decreases. Consequently, limitations on the use of stone on high-rise structures are generally more restrictive in prefabricated systems than in conventional, low rise, hand-set stone installations.

Most fabricators and installers rely on methods of stone anchorage already familiar to them, but these may not apply on projects with unusual design and performance conditions. Every project requires individual analysis of the veneer's performance criteria, determination of quality standards, and inclusion of this information in the design documents. When designing a thin stone veneer system, architects must consider the following:

1 *Evaluate the physical properties and the quality of the stone when first selecting it.* Analyze results from preliminary testing or from the tests conducted by the stone supplier to determine the adequacy of the stone. Specifying stones without test data has had disastrous consequences on some projects. Data from previous testing may be useful for preliminary analysis, but this information is insufficient for design calculations. Experienced personnel should also survey the quarry to verify that the material is available in the required quantities and quality [P/A, August 1991, pp. 45–47].

2 *Review applicable requirements of the local building code and applicable technical references and establish the design criteria and performance standards of the veneer.* These standards should include material and construction tolerances, wind loading, and factors of safety for the stone and for the anchoring system.

3 *Evaluate the interrelationship of every component in the exterior wall assembly.* The omission or failure of any one element of the wall assembly may impair the performance of others, resulting in major remedial repairs or premature replacement of veneer.

4 *When preparing design documents, thoroughly review all the component details and their roles in the overall system.* At the very least, those listed in the accompanying checklist (sidebar) should be considered.

5 *Determine and clarify structural engineering responsibility for the design of the stone veneer and anchor system.* Specifications customarily assign these responsibilities to subcontractors when allowed by local codes. For example, the City of New York's building code allows the general contractor to be responsible for the fabrication and installation of the prefabricated wall system; he may then delegate design responsibility to a licensed engineer of the subcontractor. The subcontractor may fabricate the panels with general oversight, review, and acceptance by the engineer and/or architect of record. On the other hand, the New York State Education Department (the state's professional licensing agency) requires the principal design firm to coordinate the work of other professionals – such as curtain wall designers – and to be sure that the finished product meets all design and safety requirements. Ultimate responsibility for the wall system, therefore, remains with the principal design firm.

The engineer of record cannot be expected to evaluate several different manufacturers' systems. However, for pre-assembled curtain walls, the structural frame must accommodate loads from all the components applied to it and the engineer should anticipate application of these loads to the bottom of the beams. The engineering capabilities of fabricators may be a major factor in selecting a subcontractor, since not all fabricators may be cognizant of the design responsibilities expected of them and the engineering legalities of their work.

Selecting the Right Stone Anchor

In general, building stone – whether granite, marble, limestone, or sandstone – is composed of one or several minerals, where each mineral possesses its own shape, cleavage planes, and orientation. Stones contain various weak planes or directions. The term "rift," sometimes narrowly used to describe the direction in which stone splits most easily, correctly refers to several weak phenomena which together determine the splitting direction, including 1 natural

Design Review Checklist

The preparation of design documentation should include a review of the following issues:

- Stone type, size, and slab thickness
- Specifications for performance criteria and testing program
- Type of joint, sealant, and secondary system for controlling water
- Stone joint design (horizontal and vertical expansion for thermal building movement)
- Wind and gravity loads (including seismic requirements where applicable)
- Effects of building structural frame movement, including interstory differential movement, deflection of framing members, expansion, sway, creep, and shrinkage of concrete frames
- Proper type and location of anchorage systems
- Corrosion-resistant materials and prevention of galvanic action
- Accommodations for attachments, bracing, and embedments
- Type and adequacy of veneer-supporting back-up wall
- Water infiltration design, including flashing, weeping, and venting systems for air circulation, and waterproofing
- Thermal performance requirements, including types, thickness, and thermal rating of insulation, and air and vapor barrier protection
- Compliance with local fire performance ratings for exterior wall assemblies
- Transportation and handling requirements

KEY:

1 CONCRETE FRAME WITH CAST-IN DOVETAIL RESTRAINT ANCHORS
2 CONCRETE FRAME WITH CAST-IN WEDGE INSERTS AND LOAD-BEARING ANCHORS
3 STEEL FRAME WITH BOLTED LOAD-BEARING ANCHORS
4 PRECAST CONCRETE PANEL WITH U-SHAPED WIRE ANCHORS
5 BENT ROD AND STEEL ANGLE ANCHORS
6 KEYHOLE DISK ANCHOR
7 COMMON STONE ANCHORAGE METHODS (CLOCKWISE FROM UPPER LEFT): PLUG WITH THREADED ROD, BENT ROD WITH EPOXY FILL (ROD ANGLE VARIES WITH STONE STRENGTH, FROM 22.5°–45°), ANCHOR PLACED WITH SPECIAL ROUTER, ROD ANCHOR WITH LATERAL PLUG
8 GLAZED CURTAIN WALL WITH CONTINUOUS ANCHOR
9 ANCHORS AT SIDES OF PANELS (INSET SHOWS HORIZONTAL EXPANSION JOINT, COMMONLY LOCATED AT ONE PER FLOOR LEVEL)
10 ANCHORS AT ¼-POINTS (INSET SHOWS VERTICAL EXPANSION JOINT, TYPICALLY SPACED 30'–60' APART)
11 ANCHORS AT TOP AND BOTTOM OF PANELS
12 BUCKLING OF CLADDING WITHOUT EXPANSION JOINT

1–8 *Some general rules for installation of stone anchors are:*

Anchors of every type should be fabricated of materials that are not subject to distress from chemicals in the atmosphere or are not dissolved in rainwater.

Stainless steel (300 series) anchors have the greatest elasticity and resistance to corrosion and flexure.

The anchoring method should allow adjoining slabs to move independently of one another, without restriction.

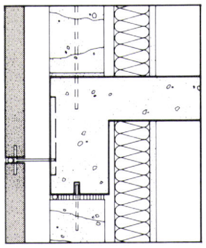
Anchors must secure the slabs from applied wind and seismic loads, as well as dead loads.

Slabs should be supported at two points (preferably at ¼-points: see 10); three or more supports will not distribute the weight uniformly. Varying position of the anchor locations may cause different stress distributions.

Contact between dissimilar metals in moist cavities or in the presence of cementitious materials can cause metal-destroying electrolytic reactions, and may precipitate seepage of salts dissolved in the masonry causing stains.

9–12 *Stone claddings and anchors are subjected to a variety of structural and environmental stresses, including dead loads, wind loads, moisture absorption and drying, frost action, shrinkage of the building frame, permanent and elastic deformations of the frame, and thermally induced expansion and contraction. Many of these can contribute to buckling of the veneer if the movements are not anticipated in design.*

13 *Cavity wall construction usually requires shims for adjusting the anchors. Shimming is expensive, difficult, and labor-intensive, and it does not always provide direct bearing of the anchor on the supporting back-up wall. Miller-Druck Specialty Contracting, Inc., a New York City installer, is experimenting with an all-stainless-steel field-adjustable system (patent pending) that promises labor savings.*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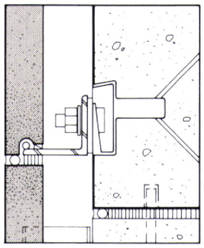
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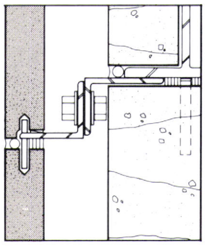
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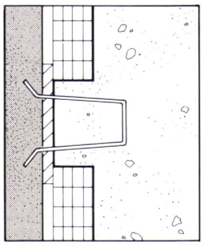
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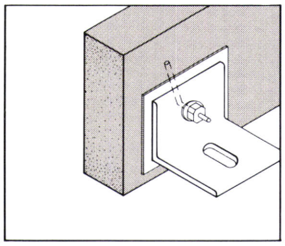
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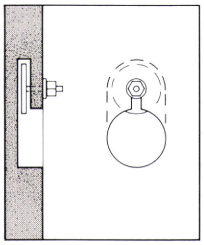
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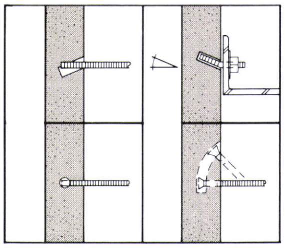
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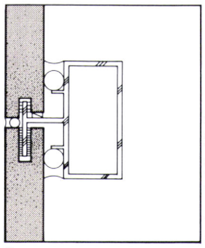
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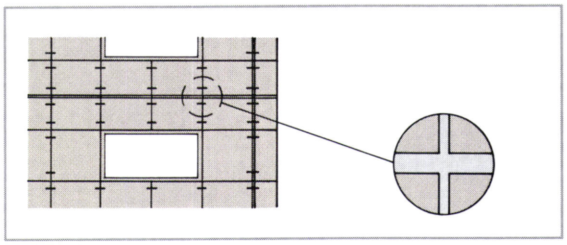
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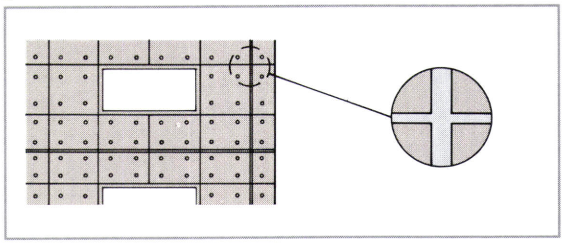
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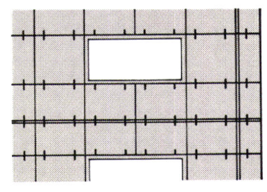
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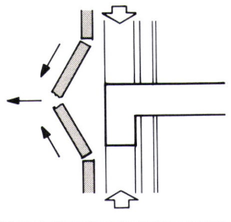
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Drawings: A. Holford Smith

development of materials, 2 presence of veins, 3 presence of inclusions and/or cavities, 4 natural bedding plane, and 5 directional orientation (sometimes, one stone may possess more than one rift). These factors influence the behavior of the stone when it is subjected to stress. The best stone specimen will react differently when its dimensions – particularly thickness and span (distance between supports) – are changed. In short, the thinner the stone and the longer the span, the more brittle the stone becomes.

Five anchoring systems – strap, rod, dovetail, expansion, and special – are commonly used to attach the stone veneer to the back-up wall. The type of anchor used depends on the type of cladding system selected. In general, there are three cladding systems: 1 conventional stone, hand-set to back-up masonry or the structural frame; 2 stone in a glazed curtain wall system; and 3 stone applied to prefabricated back-up wall. To evaluate the design of the anchor/stone composite, careful design procedures should be undertaken. The industry has adopted ASTM methods for measuring the pull-out strength of anchors in concrete for anchor/stone testing; however, the testing criteria for concrete do not necessarily apply to stone.

Moreover, standard total system performance tests for full-scale mockups of metal curtain walls, currently recommended by the Architectural Aluminum Manufacturers Association (AAMA), have been mistakenly accepted as applicable to stone veneer systems. Design loads for metal curtain wall systems have lower factors of safety than those required by stone veneer and stone anchoring systems. The results of AAMA performance tests should not be construed as adequate for stone.

Safety Factors and Anchor Loads

Standard engineering practice requires that allowable design stresses provide a margin of safety in the structural elements of both stone and anchorage systems. Factors of safety are a precaution against the variables of materials and their applied stresses, such as wind, impact, the effects of weathering, and imperfections of fabrications and installation procedures. The allowable working stress must be lower than the ultimate failure load. Factors of safety will not account for natural rifts in any one slab, and therefore cannot be used to predict incidence of slab failure.

Gravity load is the total dead load force of the stone slab applied directly to the supporting anchors. The load is calculated from the size and density of the cladding material. Since densities frequently will vary, even from one variety of granite to the next, test results data should be used for calculations whenever available. Factors of safety of at least 2.0 to that of the lateral load should be considered for anchors supporting gravity loads.

Forces applied by wind are usually the most significant loads experienced by anchors supporting veneer curtain walls. The outward or negative pressures at building corners may be double those of the base wall design. When available, the results of wind tunnel tests should be used, but under no circumstances should the loads be less than those specified by the

local building code or ASCE-7-88, *Minimum Design Wind Loads for Buildings and Other Structures*. Local conditions, including the building height, shape, and exposure, may also affect total wind loading.

No established standard or published consensus exists among professionals and trade associations regarding factors of safety for stone. Many designers average the lowest of the different values obtained from test results from a large sample and, by calculus, apply this data to safety factors (of 2.5 to 4.0 for granite without consideration for weathering, for example) to determine the allowable working stresses. Others (B. Wonneberger and S. Bortz) use a rational approach based on logical justification of engineering principles to average values of test results that correspond to groupings and their relative coefficient of variations, including weathering, to determine a factor of safety (generally 5.0 for granite).

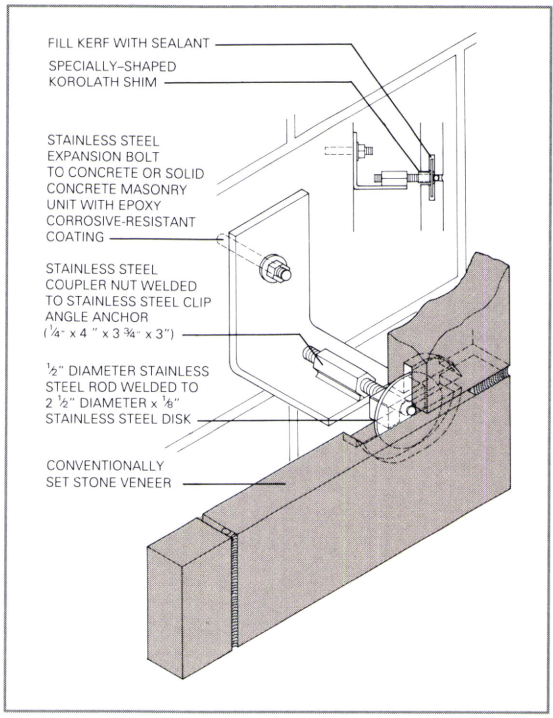
We recommend two tests in particular for determining the proper method of stone attachment to the back-up support systems: 1 The flexural strength of the stone should be tested according to ASTM C 880, and 2 the strength in shear and tension of the proposed anchor installed in stone should be tested according to ASTM E 448, modified for stone anchor strength. Other tests, including water absorption (ASTM C 97), and accelerated weathering (during cycles of freezing/heating and wetting/drying by ASTM C 666, modified) will predict the durability and behavior of the stone as it ages.

Building design must accommodate seismically induced horizontal forces in conformance to local codes. Additionally, consideration should be given to increasing the factors of safety and stone thicknesses for conventional hand-set installations, when test data and other information about stone properties are not available.

Some Common Problems

The types of stone anchors should be tested as a composite, not separately. For example: A granite was selected for an exterior wall based on the results from tests using 2¼" thick specimens with a 7" span. This granite indicated strengths of 1,760 psi. The same granite was fabricated to 1" thickness, panels being 7' 0" x 5' 6". These panels were to be supported by a continuous kerf, top and bottom, with a 7' span. About half of the kerfed edges broke in shipment. When full-size panel tests were conducted on panels supported by top and bottom kerf systems, it was discovered that the stone broke at the anchorage points at 75 percent below the required strength. Another type of anchor should have been selected for the 7'-0" span and a thicker stone should have been considered for the application.

In another situation, a rod anchor was used to support a black granite slab 4" thick, with a 6' span and a density of approximately 175 pcf. Testing substantiated that the anchor would not support the gravity loads and that engineering calculations were probably not performed.



Drawing: J. Belbusti

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Summary

The growing number of projects using exterior stone, accompanied by the increasing publicity about problems related to thin stone veneers, has stirred considerable concern throughout the building industry. Despite the volume of published papers and specifications addressing the utilization of thin stone systems, professional consensus has been rare, and the industry still seeks definitive methods of evaluating stone as a curtain wall component.

Learning from publicized mistakes is not the answer; proactive regulations, from professional associations and government agencies, must establish definitive guidelines for the use of thin stone veneer systems. Until this happens, architects and builders are wise to design cautiously. Each material within the system composite should be tested and evaluated individually. The importance of a quality anchorage installation should be stressed to both the fabricator, the project engineer, and the installation contractor. Special design consultation is recommended and a thorough inspection program should be developed and implemented for the installation of the stone and anchorage systems.

George L. Maness and **Ava Shypula** ■

George L. Maness, R.A., is the exterior systems consultant and a senior project manager for the New York firm of Helpern Architects. Maness is a specialist in the design of exterior building systems and has written for national publications of the industry.

Ava Shypula, M.S., and her firm, Ava Shypula Consulting, Inc., Ossining, New York, specialize in building stone analysis, field and quarry inspections, and stone testing. She serves on several technical committees of the Building Stone Institute and the American Concrete Institute, and is also a member of ASTM, AIC, ACS, and PWC.

Recommended Reading

"Factors of Safety in Stone," B. Wonneberger and S.A. Bortz, *Stone Through the Ages* (Marble Institute of America), Summer 1988, pp. 12–20.

Minimum Design Wind Loads for Buildings and Other Structures, ASCE 7-88 (publication 742), American Society of Civil Engineers, New York (212) 705-7538, 1990, 108 pp.

Marble and Stone Slab Veneer, Masonry Institute of America, Los Angeles (213) 388-0472, 1986, 138 pp.

The Architect's Handbook of Marble, Granite and Stone, E. Corbella and L. Calenzani, Van Nostrand Reinhold, New York (800) 926-2665, 1990, 3 vols.

Source Book for Stone Anchors and Accessories, DUR-O-WAL, Arlington Heights, Illinois (312) 577-6400.

New Stone Technology: Design and Construction for Exterior Wall Systems, B. Donaldson, editor, STP 996, ASTM, Philadelphia (215) 299-5585, 1988, 200 pp.

Architectural Precast Concrete, Precast/Prestressed Concrete Institute, Chicago (312) 786-0300, 1989, 340 pp.

Exterior Cladding on High Rise Buildings conference proceedings, Report 12, Chicago Committee on High Rise Buildings, c/o John Zils, Skidmore, Owings & Merrill, Chicago (312) 641-5959, 1990, 394 pp.

ASTM Standards

The following standards are available from ASTM, Philadelphia (215) 299-5585:

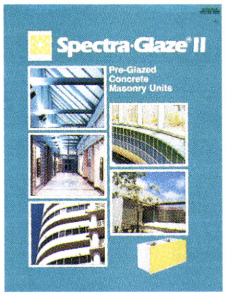
C 97 *Test Methods for Absorption and Bulk Specific Gravity of Natural Building Stone.*

C 666 *Test Method for Resistance of Concrete to Rapid Freezing and Thawing* (modified for stone).

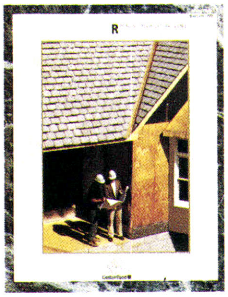
C 880 *Test Method for Flexural Strength of Natural Building Stone.*

E 448 *Practice for Scleroscope Hardness Testing of Metallic Materials.*

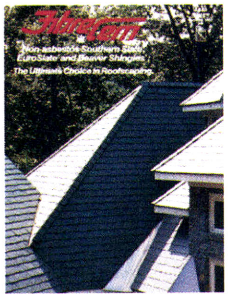
Exterior Cladding Literature Digest



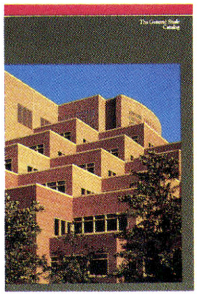
Spectra-Glaze® II pre-glazed concrete masonry units (for interior or exterior applications) are lightweight modular blocks with permanent glazed facing on one or more sides. Design options, performance data, sizes, shapes, corner and trim accessories, and construction details are included in this brochure.
The Burns & Russell Company. Circle No. 363



CertainTeed Corporation's Residential Roofing Division offers a 16-page Sweets catalog that illustrates the wide selection of styles, textures, and colors of asphalt roofing shingles in the CertainTeed Roofing Collection™. In addition to providing specification information – sizes, weights, warranties – the catalog includes product and installation photography.
CertainTeed. Circle No. 364

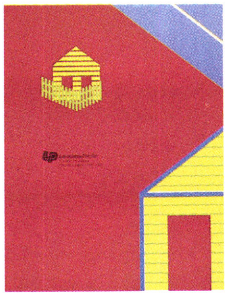


Full-color brochure from FibreCem Corporation describes features of non-asbestos fiber cement, slate-simulated roofing slates. New standard colors, descriptions of various slate products, slate characteristics, general uses, and applications (including freeze-thaw), and various Roofscaping designs are among features described; comes with a 50-year limited transferable warranty.
FibreCem Corporation. Circle No. 365



With 17 brick plants, General Shale has become the nation's second largest manufacturer, producing 92 varieties of face brick as well as special shapes and concrete block. This catalog displays the wide variety of brick hues and textures for multiple building applications along with cleaning recommendations.
General Shale Products Corp. Circle No. 371

Using the finest raw materials, Lehigh manufactures cements for a wide range of architectural applications. Select from Gray and White Portland Cements, Gray and White Masonry Cements, Custom Color Masonry Cement, Custom Color Portland Cement, Custom Color Portland/Lime Cement, Heritage Buff Masonry Cement, and Standard Portland Cement. **Lehigh Portland Cement Company.** Circle No. 372



Lap and panel sidings, soffit panel, trim, and fascia board are made from Inner Seal OSB with a protective overlay that is pre-primed to hold paint and stain longer. The Inner Seal Siding System has a consistent composition for consistent strength throughout; its exceptional moisture resistance prevents warping, splitting, and buckling.
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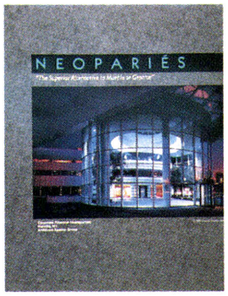
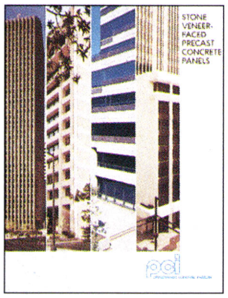
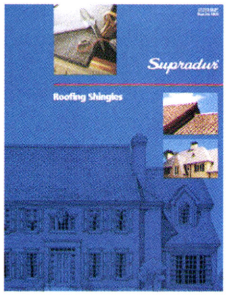


Neoparies, a wall cladding that's as practical as it is beautiful, is introduced in a four-color, four-page brochure from N.E.G. America. The brochure provides valuable information concerning Neoparies' stunning appearance, superior weather resistance and durability, zero water absorption rate, amazing design flexibility, and product specifications.
N.E.G. America. Circle No. 367

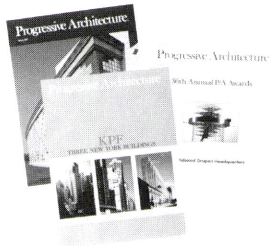
Petersen Aluminum offers a full-color, 32-page brochure featuring their complete line of fabricated metal products. Items featured include: standing seam roofing panels, soffits, copings, and curtainwall materials. All of these items are available in Kynar 500®, Metallic Kynar, and anodized finishes. **Petersen Aluminum Corp.** Circle No. 368



Natural stone has been used in building construction for centuries due to its strength, durability, aesthetic effect, availability, and inherent low maintenance costs. Large prefabricated concrete components decrease construction time and reduce costs by combining the beauty of natural stone with the strength, versatility, and economy of precast concrete. **Precast/Prestressed Concrete Institute.** Circle No. 369



Supra-Slate II is an asbestos-free replica of Supradur's Supra-Slate product, an established slate substitute for roof applications on projects such as shopping centers, hotels, historic restorations, and housing. Supra-Slate II provides "Class A" security and freeze-thaw protection; it is manufactured with beveled edges, and comes in black, gray, green, and red. **Supradur Manufacturing Corp.** Circle No. 370



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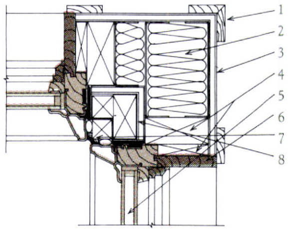

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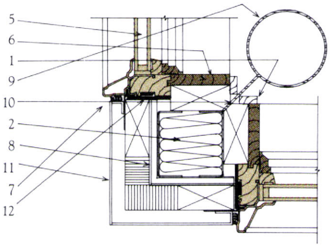
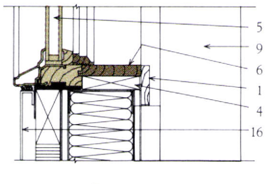
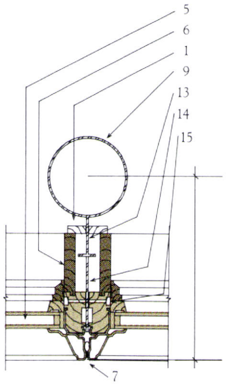


OUTSIDE CORNER DETAIL



SILL DETAIL



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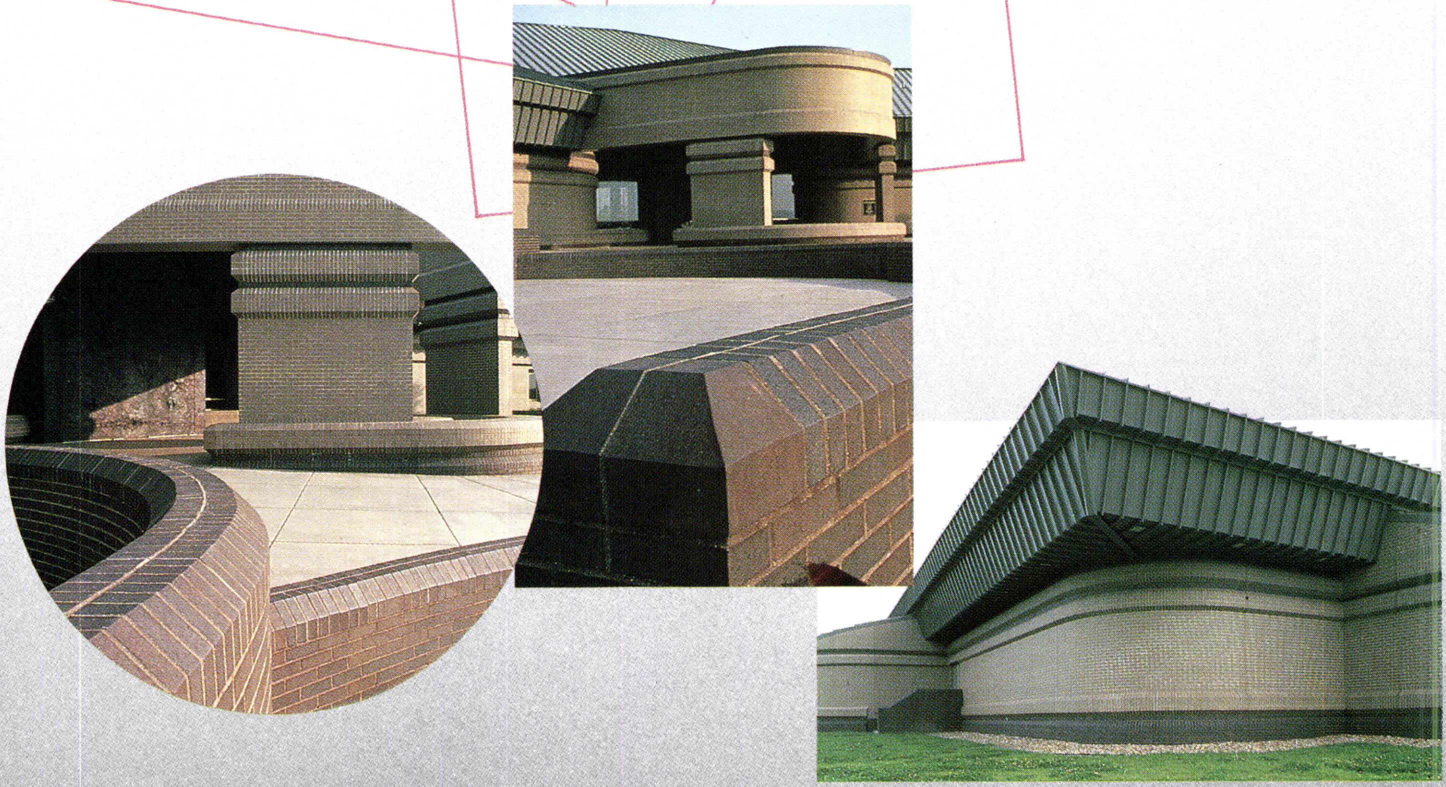
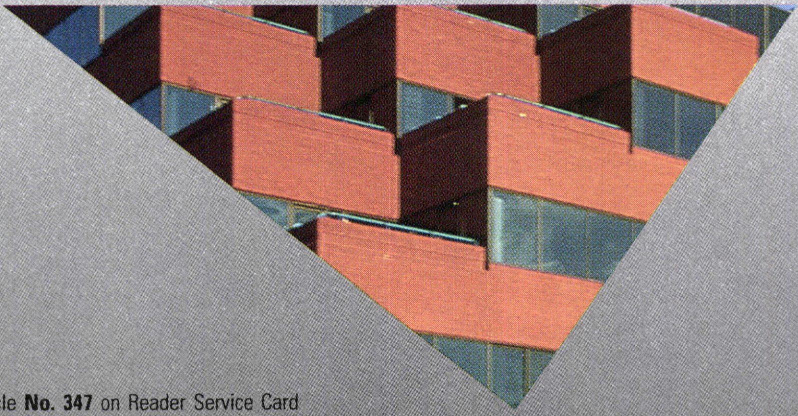
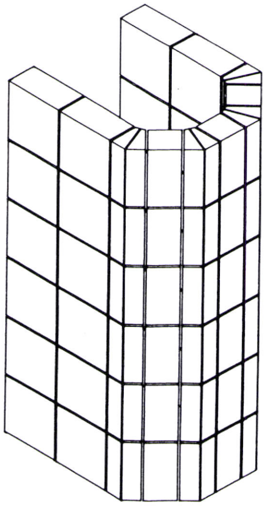




New Products and Literature

New Products and Literature

Building Products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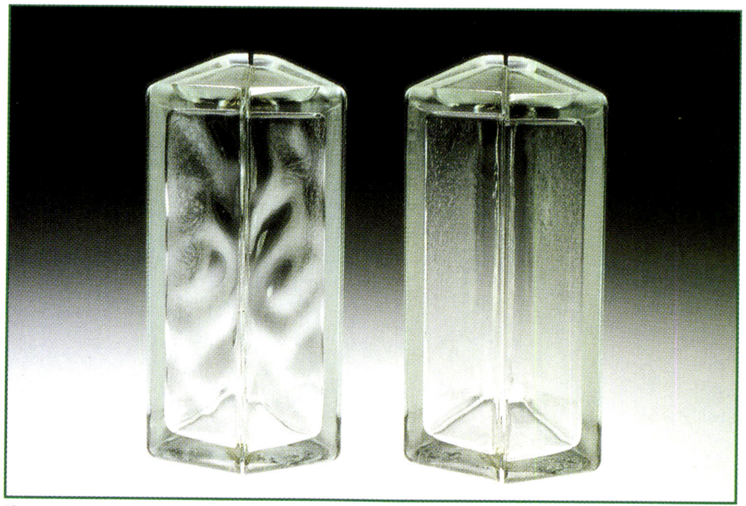
1b

1a, b Triangular Glass Block
"Tridron 45° Block"™ glass blocks may be used to form corners in glass block windows, walls, partitions, and panels, and multiple units may be used to form other angles up to a full circle. Blocks are 8 inches high and are available in Decora® or Vue® patterns. Pittsburgh Corning.
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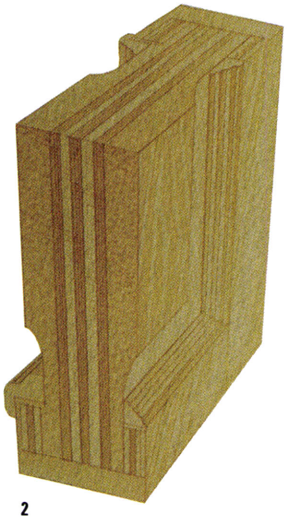
2

2 Architectural Doors
Wood raised-panel doors for commercial applications have: wood veneers, solid wood edge bands, and moldings; a continuous cross-laminated built-up core (cutouts in the core allow for customization of both sides of the door); and formed panels fixed to center cores. The doors also have a Fire-Lok® system that offers a range of fire ratings up to 60 minutes. TruLine Manufacturing.
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3

3 Exterior Wall System
The "Barrier System"® exterior wall uses engineered I-beams as studs and plates with precut rigid, foil-faced insulation panels. This "Wall Within a Wall"® has two dead air spaces; its studs use "36 percent less timber" than 2×6 construction and insulation panels are manufactured from "nearly 40 percent recycled material." Framing, insulation, vapor barrier, and air infiltration barrier require one-step assembly. The system tested at R34 "with minimal air infiltration." Barrier System®.
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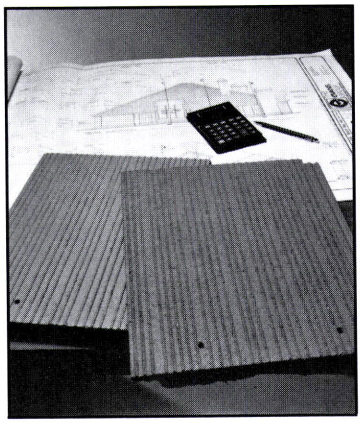
Building Products



Concrete Roof Tiles

"Palema 'S' Tile" and "Nordic Flat Tile" with smooth or ribbed surfaces are integrally colored concrete roof tiles available in custom and standard colors. The tiles are fireproof; a variety of accessories – an acrylic sealer, an oxide for mortar tinting, among others – may be specified. Bender Roof Tile.

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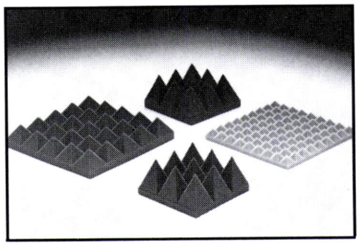

Pyramidal Acoustical Material

"ProSPEC Pyramids" acoustical material "scatters and deflects sound waves. . . [and] increases the sound-absorbing surface area." Two-, three-, four-, or six-inch thicknesses, all in 2′ × 2′ sheets, are available. Several color and material choices are also available. Illbruck.

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New Fire Stop Ratings

Underwriters Laboratory has assigned a four-hour fire rating and a three-hour temperature rating to Dow Corning sealant products in joints up to six inches wide. The concrete-to-concrete test joints were six inches wide with a ¾-inch layer of fire stop sealant over four inches of mineral wool. The Dow Corning ® Fire Stop System creates "a complete barrier against the passage of fire, smoke, water, air, and dust." Dow Corning.

Circle 105 on reader service card

PVC Accessories Catalog

This 1992 catalog of PVC accessories for stucco and plaster (expansion joints, slip joints, etc.), drywall (reveals, trim tabs, etc.), and EIFS (starter strips, corner beads, etc.) includes specifications for more than 30 products. Plastic Components.

Circle 200 on reader service card

Flooring Guide Book

Mechanical Properties of Floor Surfaces is a new 10-page booklet published to help evaluate floor product performance for commercial, manufacturing, and warehousing facilities. Toughness, abrasion statistics, impact resistance, liquid absorption, and surface quality parameters are discussed. Master Builders.

Circle 201 on reader service card

Cellular Floor System

The "Cellcast Floor System" is designed to offer "high capacity, low-cost wire and cable distribution for cast-in-place concrete construction." It has a built-in wire raceway system and steel floor units to carry all dead and live loads. The system uses a monolithic concrete pour for slabs, beams, and girders; 5- or 6-inch slab depth is required. (This product was published with an incorrect headline, Sep. 1991, p. 161). H.H. Robertson.

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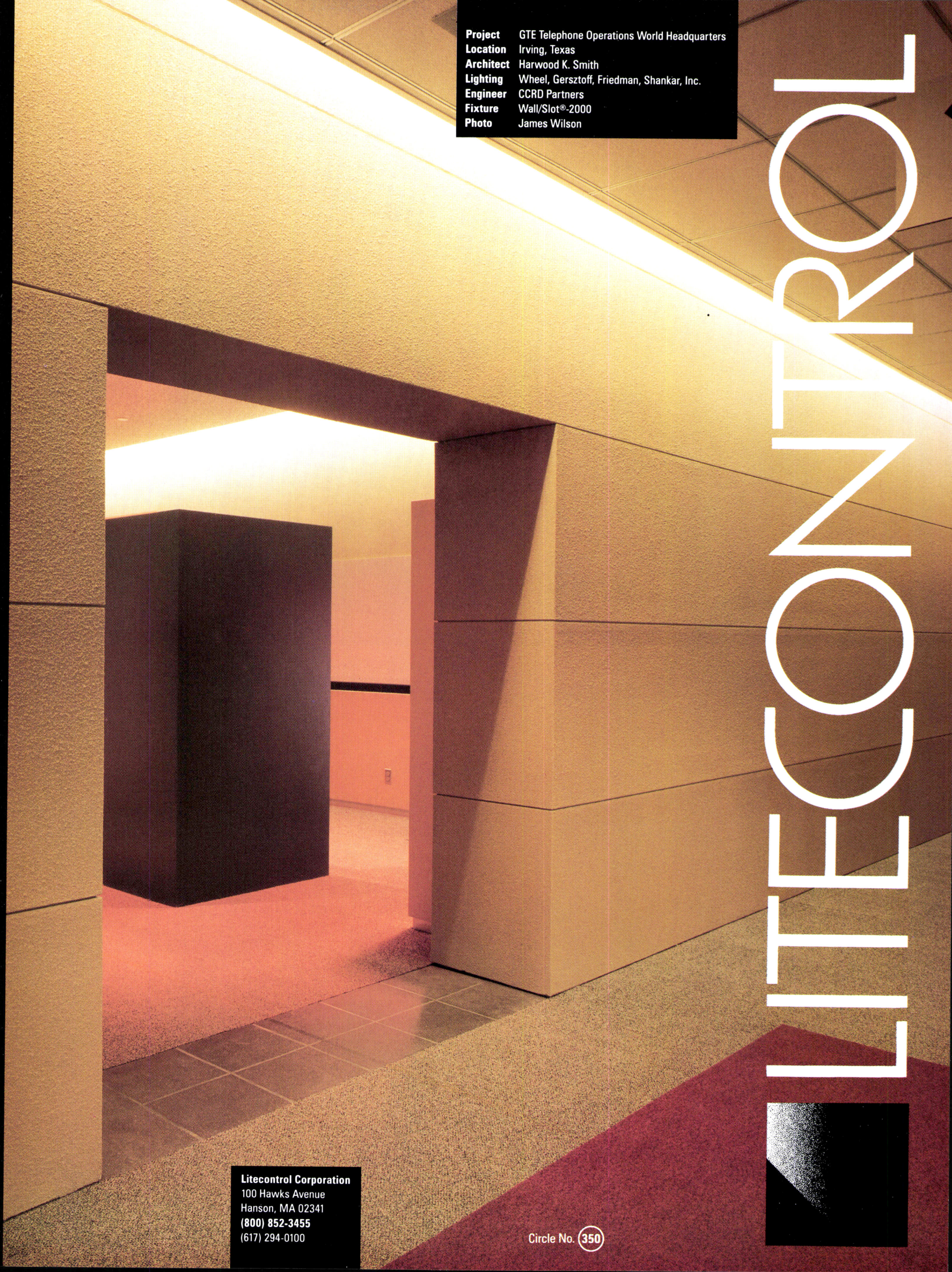


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Holiday Designs

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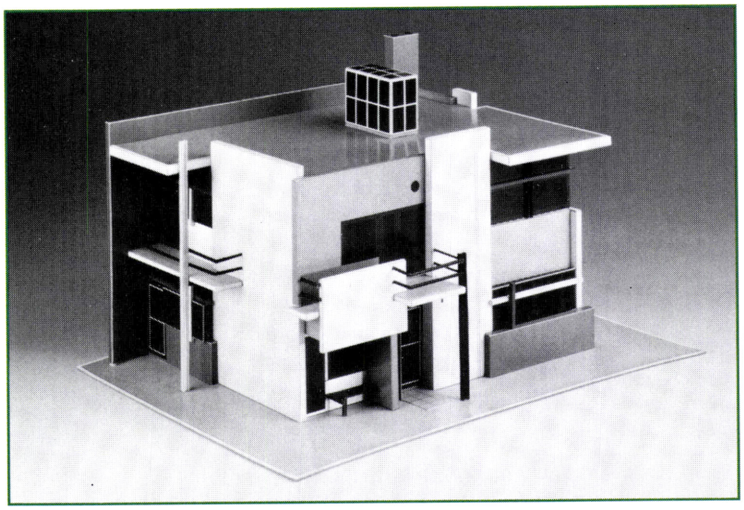

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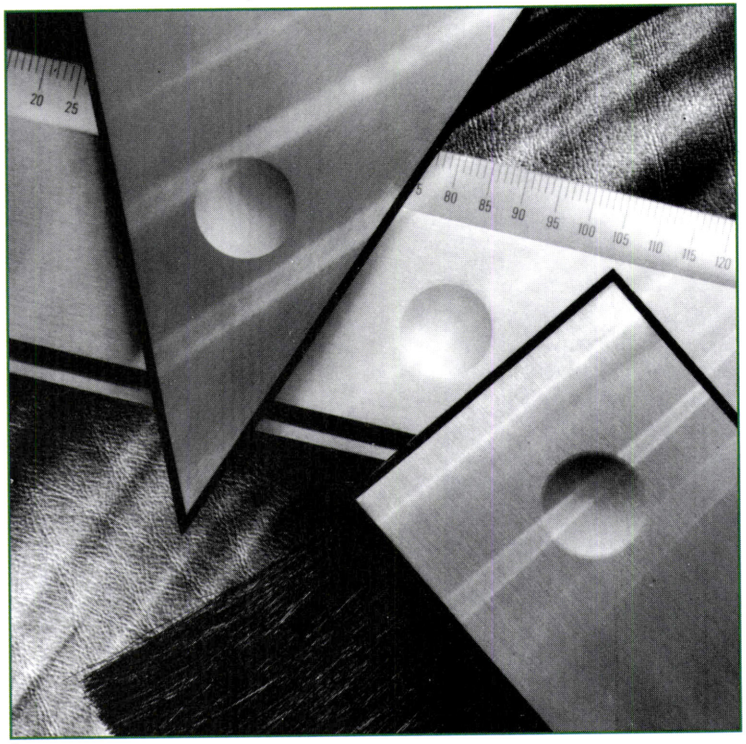

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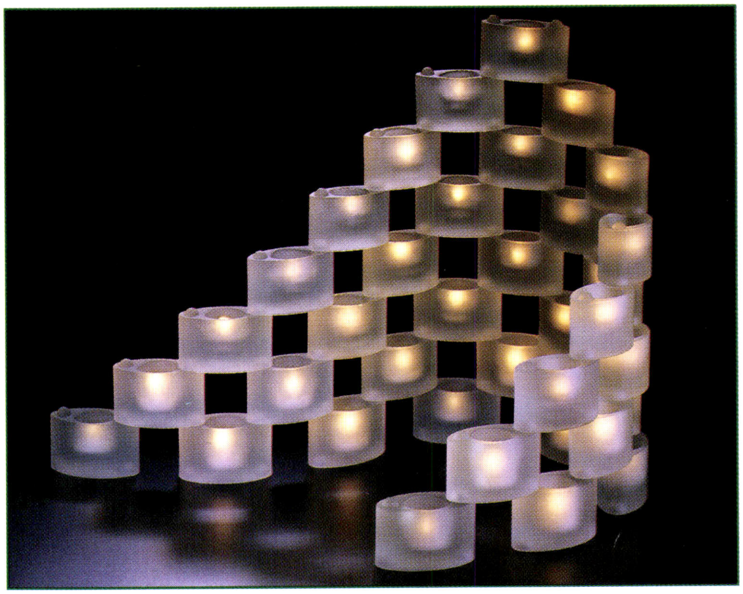

Jon Jones

4

1 Recycled Paper
These sketchbooks/journals are made from 100 percent post-consumer waste (newspaper, primarily) that is neither de-inked nor bleached. Two sizes are available: 11″ × 14″ and 8″ × 8″. Museum of Modern Art, New York, (800) 447-6662. Cost: $16, large (No. 71082), $14, small (No. 71083).

2 Model Architecture
Among the scale models of major 20th-Century buildings and designs, manufactured by Thoth Publishers, Amsterdam, are Gerrit Rietveld's Schröder House and Frank Lloyd Wright's Robie House. AIA Press, 1735 New York Ave., NW, Washington, DC 20006 (202) 626-7585. Cost: $20–$90.

3 Smudge-proof Drafting Tools
These anodized aluminum and colored-plastic drafting tools, designed by Cindy Coleman of Chicago and engineered by Sava Cvek of Boston, have retractable ball-bearings, allowing free movement in all directions. Align, 410 S. Michigan Ave., Suite 726, Chicago, IL 60605 (800) 432-1432. Cost: $65–$80.

4 Modular Candle Holders
The "Catseye Candle Holder," designed by Handler of New York, is a system of cast glass units, each with raised forms on top and corresponding cavities underneath. Design Ideas, P.O. Box 2967, Springfield, IL 62708 (217) 753-3081. Cost: $6 each.

(continued on page 142)

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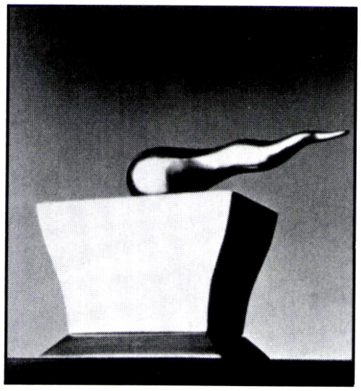
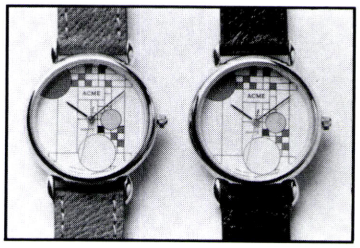
Holiday Designs



Starck Models

Philippe Starck's buildings have been produced as scale models. His Asahi building (above) is polished aluminum and is 5⅗ inches high, 7⅕ inches long, and 7⅗ inches long. Other models include Miss Zenzen, Nani Nani, Moondog, Le Moult, and Laguiole. Modern Age, 795 Broadway, New York, NY 10003 (212) 674-5603 or FAX (212) 674-5604. Cost: $300–$700.

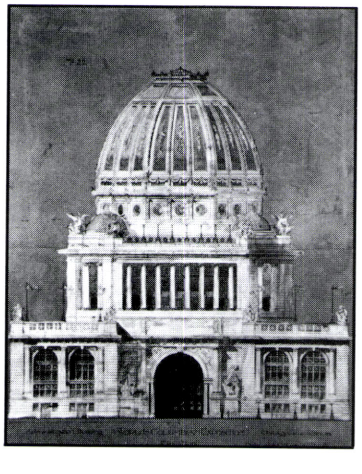


Wright Watch

This wrist watch, based on a design by Frank Lloyd Wright, is being offered in conjunction with Domino's Center for Architecture & Design. The quartz movement is guaranteed for one year; the strap is in black or brown leather. ACME Studios, P.O. Box 89, Kula, Maui, HI 96790 (808) 878-2541 or FAX (808) 878-6045. Cost: $70.

Le Corbusier's Rule

"Le Corbusier Modulor Rule" is a plastic-coated fiberglass-reinforced measuring tape (with feet/inches and meters) on one side and the architect's Modulor measurement system on the other side. This 90-inch-long tape comes in a round aluminum can. Princeton Architectural Press, 37 E. 7th St., New York, NY 10003 (800) 458-1131 (212) 995-9620 or FAX (212) 995-9454. Cost: $22.

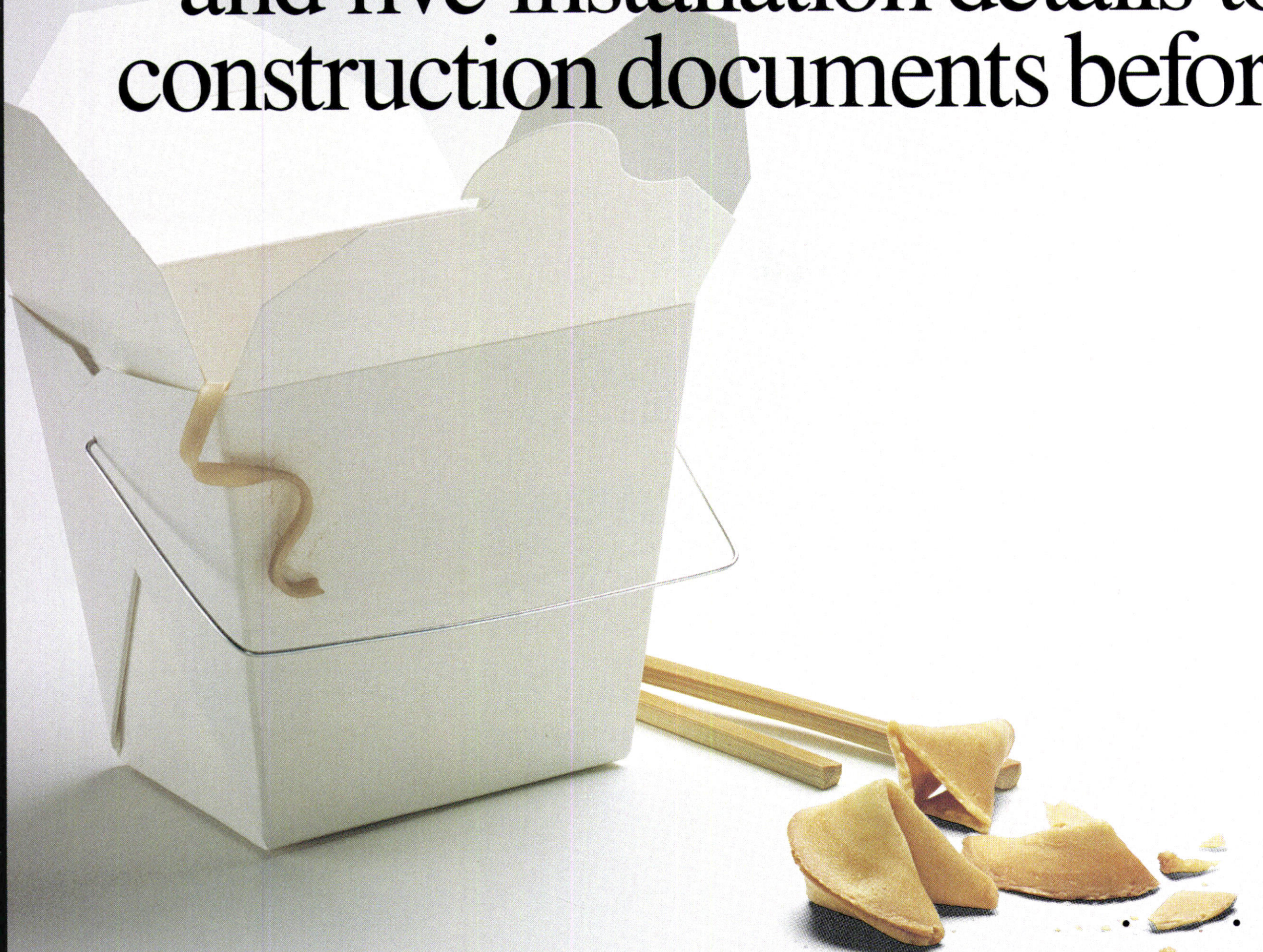


Architectural Posters

Richard Morris Hunt's World's Columbian Exposition Administration Building is one of a series of full-color posters. It is produced from a blueline print with watercolor and gouache on paper. The poster is 23″ × 38″. AIA Press, 1735 New York Ave., NW, Washington, DC 20006 (202) 626-7585. Cost: $10.95.

(continued on page 144)

How to add three new spec sections and five installation details to your construction documents before lunch.



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The publisher of PROGRESSIVE ARCHITECTURE is Robert J. Osborn; the editor is John Morris Dixon, FAIA; and the managing editor is Valerie Kanter Sisca. They are located at 600 Summer Street, P.O. Box 1361 Stamford, Connecticut 06904.

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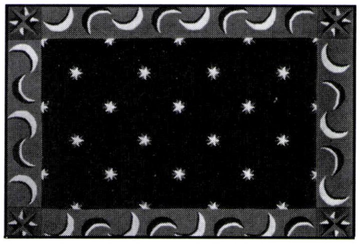
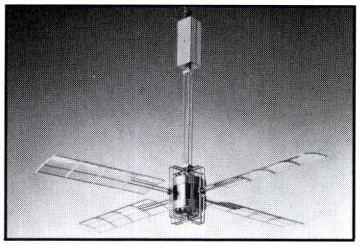
Sal F. Marino, Chairman and CEO, Penton Publishing, Inc.

(continued from page 142)

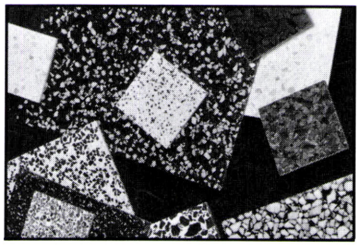
Interior Products



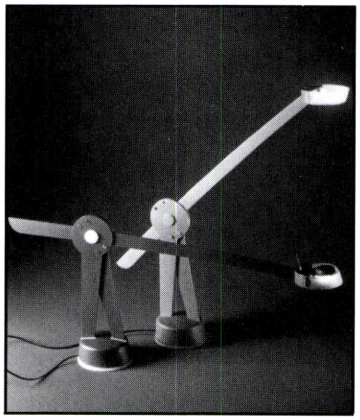
Hand-tufted Rugs
"Moon and Stars" is one of many hand-tufted rugs designed by Christine Van Der Hurd of New York. It is constructed with 100 percent wool yarns and is 6′ × 9′. Christine Van Der Hurd.
Circle 107 on reader service card



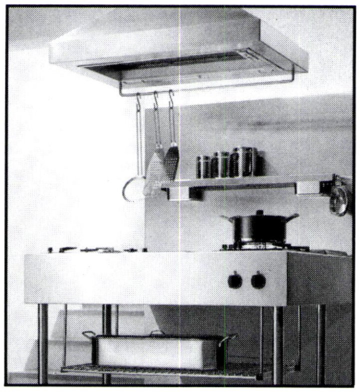
New Ceiling Fan
The "Ventilator" is a stainless steel and cast aluminum, four-speed ceiling fan. The fan is 40″ in diameter. Prologue 2000.
Circle 108 on reader service card



Terrazzo Floor Tile
"Tuxedo Limited" is a new terrazzo floor tile of black, white, and gray marble chips in a variety of tonal combinations. Twelve standard colors are offered. Fritztile.
Circle 109 on reader service card



Task Lamp
"Pierrot," a low-voltage halogen task lamp designed by Afra and Tobia Scarpa, has no internal or external wiring from transformer to lamp; its base swivels and its lever-arm moves vertically. It is 17⅗″ high and 35⅘″ long. Arms and legs are in a blue-gray enamel with a violet diffuser, turquoise with red, or natural copper with green. Flos.
Circle 110 on reader service card



Kitchen Systems Brochure
An extensive line of modern and traditional kitchen systems is illustrated in this 116-page brochure. Lacquered, laminated, and book-matched wood veneer cabinet finishes are available with Corian or wood countertops. Allmilmö.
Circle 202 on reader service card

Corian Brochure
This new brochure describes performance capabilities, application possibilities, and 18 color options of Corian surfacing. Du Pont.
Circle 203 on reader service card

Computer Products

3D Modeling Tools

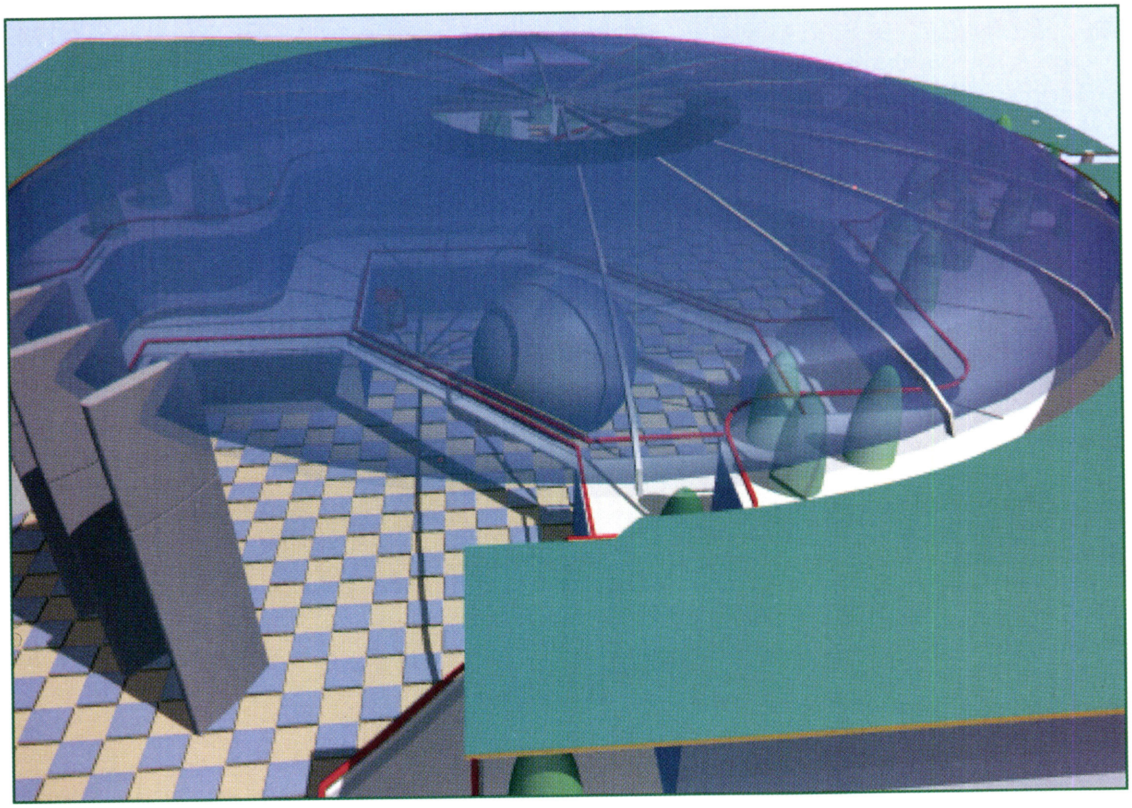
1 Complete CAD
Version 4.0 of ArchiCAD® for the Macintosh, which has enhanced presentation capabilities, is now available. The package allows a user to work simultaneously in 2D and 3D, and includes an extensive architectural object library and an integrated database with an automatic bill of materials. Graphisoft.
Circle 111 on reader service card

2 CAD Modeler
"Modelshop II" allows a Macintosh user to import 2D AutoCAD® DXF, Claris® CAD, or PICT files and turn them into rendered 3D models that you can "walk through" with a mouse or use to create animated presentations. Paracomp.
Circle 112 on reader service card

3 Macintosh Design
"Virtual Graffiti™," the ability to "paint" on any 3D surface (including scanned images), and "SpiderVision™," an animation tool, are two new features of Upfront™ Version 2.0 for the Macintosh. Alias.
Circle 113 on reader service card

4 Image Enhancement
High-resolution 3D images can be created from scratch or imported from AutoCAD, "RenderMan," or "3-D Studio" and then enhanced. RxIMAGE©, which resides on a "RASTEREX" graphics board, offers a choice of 16.7 million colors and the ability to incorporate scanned images with CAD drawings on a PC. Rasterex.
Circle 114 on reader service card

(continued on page 146)



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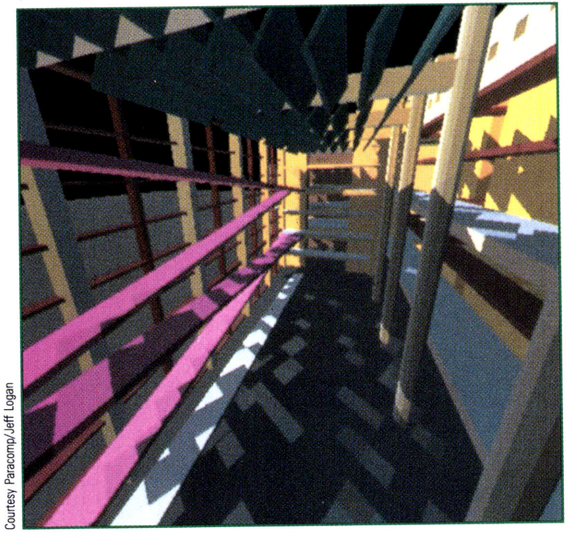

Courtesy Paracomp/Jeff Logan

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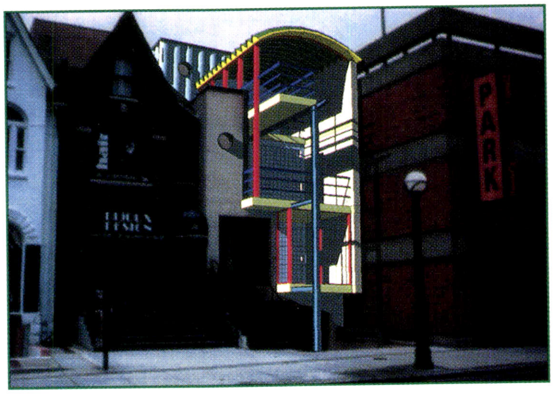

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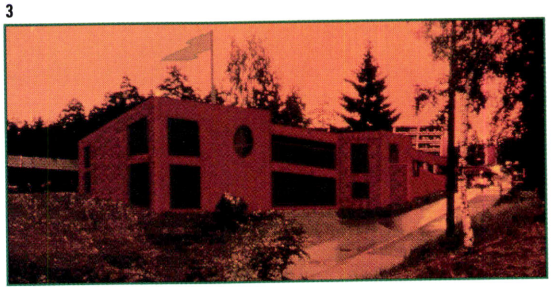


4

Books

(continued from page 102)

German architecture of the 1920s was largely shaped by the Museum of Modern Art's International Style Exhibition, it was but one of several readings. Current German research has cast a different light on this period, revealing that architects of the early 20th Century (indeed, Werkbund architects!) built in three distinct modes – Modernism, Traditionalism, and Expressionism. Bruno Taut is a case in point: His built *oeuvre* falls into *all* these categories. Moreover, the severity of many German *Siedlungen* erected in the late 1920s was often the result of economic rather than aesthetic austerity.

In his introduction, Dal Co acknowledges that in the nine years since he first published these essays, subsequent scholarship has influenced the general perspective on this period. Thus, Dal Co's texts acquire a double meaning: They are scholarly investigations of a previous culture, yet can themselves be analyzed as historical documents.

In *Berlin: The Politics of Order*, Alan Balfour questions the power of architecture in a city where urban "context" has proved to be so volatile. Certainly, this query is fundamental to any examination of Berlin. Balfour applies it to a specific site in Berlin, the legendary Potsdamer Platz.

Laid out as part of a Baroque city extension of 1737, this "square" (in reality it was a crossroads) became a bustling urban node in the 20th Century. Its pivotal location in Berlin (and by extension, Europe), suggested to many that it was the center of the world. Bombed in the Second World War, it was incorporated into East Berlin. Although some damaged buildings could have been restored (such as Mendelsohn's Columbus Haus, 1930–32) all extant structures on the square were demolished. Since 1961 Potsdamer Platz has ceased to exist, yet its memory is preserved by the ghostly outline of streets in the no-man's land that once stretched east of the Berlin Wall.

It is the observation of this reviewer that German scholarship can be characterized as heavy on research and light on analysis, while in America the opposite is often true. Despite the aforementioned aspirations, Balfour's book suffers from the American syndrome and is riddled with problems: German words and proper names are misspelled, the period from 1737 to 1920 is rendered schematically, and the author strays to discuss buildings built elsewhere in West Berlin from 1960 to 1989. (This thematic expansion would have made sense if comparable structures in East Berlin had also been discussed.) While the author discusses the Nazis and the Communists, he fails to address the ways the politics of the Social and Christian Democrats, the "Greens," and the radical autonomes have influenced the activity on Potsdamer Platz.

Arguably, one error, the belief that Columbus Haus was used as a prison by the S.S. (a fact accepted by many scholars and only recently discounted) was not Mr. Balfour's fault. Nevertheless it puts into question the author's interpretations that involve this building and sadly negates the poignancy in the section "A Dialectic: Hitler and Mendelsohn."

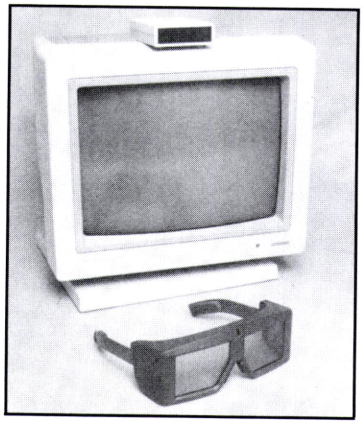
Mistakes and omissions aside, Balfour's writing, particularly on the buildings of Mendelsohn and on those designed for Hitler, is rich; his reading of photographs, insightful. One wishes that Balfour had foregone architectural theory and instead written a novel whose main characters were buildings in Berlin. It would have allowed him to accomplish, in a work of art, what academic writing does not allow: taking fragments from reality and transforming them, through the power of one's imagination, to reveal something of the truth.

Mary Pepchinski ■

The author teaches architecture at the Technische Universität Berlin, and contributes to P/A and to other publications in Europe and the United States.

(continued from page 145)

Computer Products



Stereo View

The "CrystalCAD" package uses the StereoGraphics CrystalEyes™ viewing system (a monitor and goggles), DXF-compatible software, and a "stereo-ready" graphics-display controller to create convincing 3D stereoscopic images. StereoGraphics.

Circle 115 on reader service card

Plot Fax

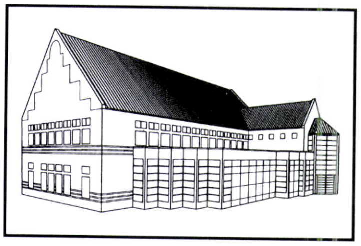
A new network computer option translates CAD drawing files into fax format and transmits them via modem to create a high-resolution plot. B-, C-, or D-sized plots are sectioned into strips up to 36″ long that are reassembled easily. Byers Engineering.

Circle 116 on reader service card

Means Data

The MeansData™ set for Lotus 1-2-3 provides cost-estimating data that can be searched by CSI Masterformat number or by a descriptive word. The system allows users to integrate their own construction data with the files provided. R.S. Means.

Circle 117 on reader service card



Window Details

"CADD-I® Version 2.0" is a free utility that offers PC users the ability to specify and draw Andersen® windows in 2D or 3D in most CAD packages. Andersen.

Circle 118 on reader service card

Large Thermal Plots

With "TIMAGE™" software it is possible to generate gray-scale plots as large as E-size on this manufacturer's thermal plotters. Graphtec.

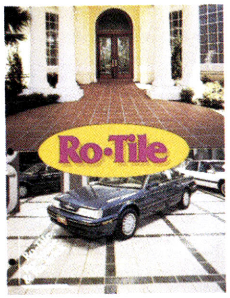
Circle 119 on reader service card

Building Materials

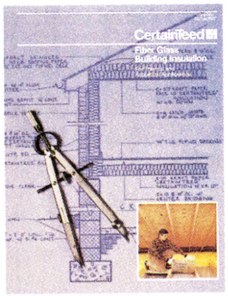
Major materials suppliers as they were furnished to P/A by the architects for buildings featured this month.

Project: Crawford House, Montecito, California (p. 54). *Architects: Morphosis, Santa Monica.* Concrete supplier: Granite Concrete. Steel supplier and custom steel handrails: A&H Steel. Gypsum board: United States Gypsum. Steel sash windows: Metal Window Co. Custom wood window: Ambrose Myers. Aluminum sash: Aluminex. Custom wood and copper entrance door: architects, contractor, and Churchill Sheet Metal. Batt insulation: Owens Corning. Downlights: Halo. Step lights: Bega. Electric distribution and switching system: Lite Touch. Tubs: Kohler. Bathroom lavatories: Kroin. Kitchen sink: Elkay. Bath fixtures: Dornbracht-Doumani, Kroin. Concrete sinks: Syndesis. Paint: Frazee. Brushed steel hinges

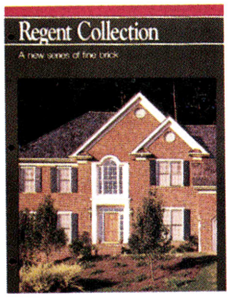
(continued on page 151)



Ro-Tile Inc., manufacturers of high-quality, naturally beautiful concrete floor and wall tiles, has published its new 1992 catalog. The full-color catalog has complete technical information on Ro-Tile, Ro-Stone, and Ro-Brick, the company's main products. Design idea photos and related data are also included.
Ro-Tile Inc. Circle No. 359

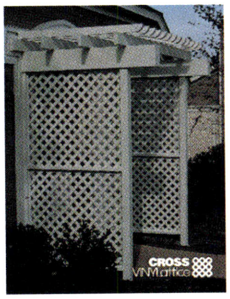


This 12-page catalog details CertainTeed's complete line of fiberglass insulation for residential and light commercial applications. It contains complete product specifications and availability, information on vapor barriers, and the latest codes and specifications.
CertainTeed Corp. Circle No. 351

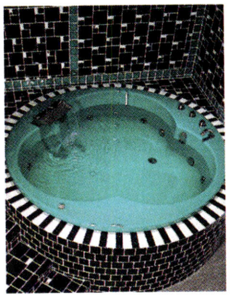


General Shale has added 17 beautiful faces to its growing family of brick products: the Regent Collection. This brochure features these seemingly hand-molded, asymmetrical residential bricks in a variety of colors and applications.
General Shale Products Corp. Circle No. 355

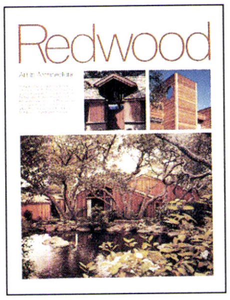
Watercolors Inc., introduces a bathtub set with a handshower in its Coriandoli Line of faucets. This solid cast brass series is stocked in 24 epoxy colors and finishes, with 12 models of bathroom and kitchen faucets available Quick-Ship. Matching color accessories are also available.
Watercolors Inc. Circle No. 361



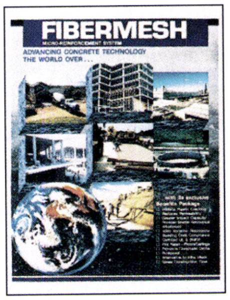
Available in three weights, two patterns, and nine colors plus white, there is a CROSS VINYLattice product suitable for any functional or decorative application, exterior or interior.
Cross Industries. Circle No. 353



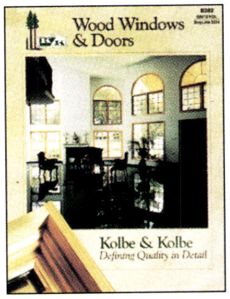
Kallista is a Greek word meaning "most excellent, most beautiful." The unique, custom luxury products available from Kallista exemplify this word in every way. The brochure, *A Total Environment*, provides an overview of Kallista's beautiful and excellent products, including bathtubs, whirlpools, faucets, accessories, basins, shower fixtures, and shower enclosures.
Kallista Inc. Circle No. 356



This eight-page color booklet provides technical information for specifiers. A guide to properties, grades, sizes, and patterns of redwood lumber, this booklet includes easy-to-understand charts and drawings of redwood siding and paneling sizes and patterns. Finish and hardware recommendations are also presented.
California Redwood Association.
Circle No. 352



An expanded 12-page, full-color Fibermesh™ brochure is the industry's most complete, authoritative guidebook on fibrous concrete. It spells out Fibermesh benefits: how it inhibits plastic shrinkage cracking; imparts toughness; increases impact capacity; adds shatter-resistance; reduces concrete permeability; saves on wire mesh costs and problems; reduces construction time.
Fibermesh Company. Circle No. 354



Designed especially for architects, Kolbe & Kolbe's expanded Sweets catalog in the GBR and HBR files provides descriptions and features at a glance, sizing and detail information, and cutaway drawings for the company's full line of windows, patio doors, and sash doors. It also has a section on the company's full custom and specialty window capabilities.
Kolbe & Kolbe Millwork Co., Inc. Circle No. 357

(continued on page 150)

UNIVERSITY ARCHITECT

The University of Virginia seeks a highly qualified University Architect to provide architectural advice to its senior administration and Board of Visitors and to oversee development of the University's physical setting and facilities.

Reporting to the President, the University Architect shall exercise design authority over all facilities planning, and overall architectural and landscape architectural design at the University with the goals being to obtain the desired reciprocity between academic planning and physical planning and to achieve the objectives described in the University's vision statement for the planning and the design of its buildings and grounds.

The University Architect is expected to be a nationally recognized registered architect, landscape architect or planning professional or architectural historian possessing: a high level of professional and academic qualifications; a demonstrated understanding of the principles of classical and traditional architecture and landscape architecture; and someone who is accomplished in the planning and design of college and university institutions and who is knowledgeable regarding the intricacies involved in project management.

The University Architect should be qualified for appointment to a tenure track position on the School of Architecture faculty.

Applications and nominations will be received until the position is filled and should be sent to:

Office of the President
University of Virginia
P.O. Box 9007
Charlottesville, VA 22906

The University of Virginia is an Equal Opportunity/Affirmative Action Employer

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RICE UNIVERSITY

School of Architecture invites applications for position of Dean. Applicants should have experience in the teaching of design and in the practice of architecture. Architecture at Rice has been regarded and taught as one of the Humanities with a strong emphasis on design. Candidates should be able to present evidence of academic/professional qualifications and scholarly work commensurate with the job. Active participation in teaching as well as administration is expected of the Dean. Consideration of applications will begin immediately and continue until position is filled. However, the University wishes to install the new Dean by August 1992. Rice University is an Equal Opportunity/Affirmative Action employer. Applications from women and minorities are encouraged. Letters of interest, including curriculum vitae, or nominations should be forwarded to: Dr. Neal Lane, Provost; c/o Doris Anderson, Search Committee, School of Architecture, Houston, Texas 77251-1892.

Architectural History Position

The Department of Architecture, U.C. Berkeley, is searching for a historian for a tenure track (assistant professor) or tenure (associate or full professor) level starting in the 1992-93 academic year. Candidates should have a Ph.D.; a specialty in modern architecture and urbanism with an interdisciplinary perspective; interest and experience in international, preferably multicultural, research and teaching; and a demonstrated commitment to teaching. The person appointed to fill this position will be expected to teach undergraduate and graduate lectures and seminars. Our students include undergraduate and masters-level students in architecture, as well as doctoral students in architectural history.

Application forms for this position are available from the Secretary to the Search Committee, Department of Architecture, College of Environmental Design, University of California, Berkeley, California 94720. Completed applications must be postmarked no later than December 15, 1991.

The University of California is an Equal Opportunity Affirmative Action Employer.

HARVARD UNIVERSITY
GRADUATE SCHOOL
OF DESIGN

FACULTY POSITION IN LANDSCAPE ARCHITECTURE BEGINNING ACADEMIC YEAR 1992-93

Junior Academic Position in Design and a Secondary Speciality

A faculty position is available for a person qualified to offer graduate-level instruction in landscape architecture design studio plus a secondary specialty such as visual studies, design theory, construction, or science and technology. A full-time position as Assistant Professor may be filled for a fixed initial term, normally of three years, with responsibilities for teaching, scholarship and administration. Candidates should have some teaching experience and their creative work in design, scholarship or professional practice, or a combination thereof, should indicate strong promise of creative achievement in the field.

APPLICATIONS: *Applications are invited before December 1, 1991 on the forms available from:*

Office of Human Resources
Harvard University
Graduate School of Design
48 Quincy Street
Cambridge, MA 02138
(617) 495-4322
or may be requested by
FAX (617) 496-5310

Applicants should **not** *send portfolios or dossiers with their applications.*

Harvard University is an equal opportunity/affirmative action employer.

TO ANSWER BLIND BOX ADS

Respond to:

Progressive Architecture
Job Mart – (Assigned Number)
P.O. Box 1361
600 Summer Street
Stamford, Connecticut 06904

Assistant or Associate Professor of Architecture

Structures and Building Technology

The School of Architecture invites applications for a full-time faculty position in Structures and Building Technology. Candidates should have a professional degree in architecture or a masters degree in engineering. Teaching responsibilities will include required structures courses, elective technology courses, and contribution to the design studio curriculum. Prior teaching experience and expertise in computer applications will form an important basis for consideration as will evidence of strong research potential. The salary will be commensurate with experience.

Minorities and women are encouraged to apply. Applications in the form of a letter of interest, curriculum vitae, and the names and addresses of three references should be submitted by January 10, 1992. Screening of applicants will continue until an appropriate candidate is selected. Applications should be sent to:

Kenneth A. Schwartz, Chair
Search Committee
School of Architecture
University of Virginia
Charlottesville, Virginia 22903

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FACULTY POSITION IN ARCHITECTURE

The School of Architecture at Princeton University is seeking candidates for faculty positions at the rank of Lecturer, or Assistant Professor (tenure-track). Candidates must demonstrate excellence in teaching design, and in one of several other areas: Theory and Criticism, History of Architecture, Urbanism, Landscape Studies, Building Science, Representational Studies. Qualifications should include: previous teaching experience, recognized excellence in architectural design, and the ability to carry out scholarship and research in one of the areas of specialized interest. Teaching responsibilities include participation in the undergraduate and graduate programs. The position is to begin in September 1992. A letter of interest and curriculum vitae should be sent before November 15, 1991 to:

Faculty Search Committee
Princeton University
School of Architecture
Princeton, NJ 08544

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Advertising Rates

Situation Open advertisements: $200 per column inch, per your layout. Maximum 30 words per column inch. Maximum 6 column inches. Display style advertisements are also available in fractional page units starting at ¼ page and running to full page. Commissionable to recognized advertising agencies. No charge for use of box number.

Situation Wanted advertisements: $85 per column inch. Maximum 30 words per column inch. Non-commissionable. No charge for box number.

Check should accompany the advertisement and be mailed to **Lynne McLaughlin, Progressive Architecture Classifieds, 1100 Superior Ave., Cleveland, OH 44114. Telephone: 216/ 696-7000, Ext. 2524. Ads may be telecopied: 216-696-1267.**

Insertions will be accepted no later than the 1st of the month preceding month of publication. Copy to be set due seven days earlier.

Dean of the School of Architecture

The Dean is responsible, as chief academic and administrative officer of the School, for the administration and supervision of professional programs leading to the degrees of Bachelor of Architecture, Master of Architecture I, and Master of Architecture II. The Dean of the School of Architecture reports to the Provost and participates with other members of the Administration in long range planning.

Applicants and nominees should be committed to Architectural Education and have demonstrated professional accomplishment. Administrative experience at a senior level and a capacity for the energetic leadership of a diverse faculty and student body are important criteria.

Letter of interest and nominations are welcome and should be submitted as soon as possible to:
Chair, School of Architecture
Dean's Search Committee
Office of the Provost
Tulane University
New Orleans, LA 70118

Final applications will be due December 15, 1991, and it is the intent of the University to appoint a new Dean effective July 1, 1992. Tulane University is an equal opportunity/ affirmative action employer. Qualified women and minority group members are strongly encouraged to apply.

Penn State's Department of Architecture anticipates availability of tenure track and visiting positions at the assistant or associate professor levels to teach architectural design beginning Fall 1992.

Emphasis is on inquisitive design and criticism with ability to teach in related areas of (1) theory, (2) history and (3) technology. Desirable credentials include: advanced professional degree in architecture, or equivalent education, practice and teaching; evidence of teaching competence; high quality design; research and publications; and professional registration.

Applications received by December 10, 1991 will be assured consideration. However, all applications will be considered until positions are filled. Submit curriculum vitae and names and addresses of three references to: Professor Peter Magyar, Department Head, 206 Architecture Unit C, Box AS, University Park, PA 16802. Affirmative Action/ Equal Opportunity Employer. Women and Minorities are Encouraged to Apply.

THE SWISS FEDERAL INSTITUTE OF TECHNOLOGY AT LAUSANNE, SWITZERLAND

invites applications for several part time tenured track positions in

ARCHITECTURAL DESIGN AND THEORY

(Eventual specific fields in: Basic Design Construction, Computing, Theory and History)

The main task of these positions will be to teach design in studio and give a course in architectural theory.

Teaching will be given in French.

Applications deadline: December 15, 1991

Beginning of activity: fall 1992 or 1993

Further information at the following address:

Secrétariat général de
l'Ecole polytechnique féderale
de Lausanne
CE-Ecublens
CH-1015 LAUSANNE/SUISSE

LEHIGH UNIVERSITY, BETHLEHEM, PA - Assistant Professor - Full-time tenure-track position in 4-year program leading to B.A. in Architecture. Professional degree in architecture plus Ph.D. or equivalent. Teaching experience in design and intellectual content of architecture. Teaching design studio and other area of specialization. Publication record expected.

Submit application, vitae, three references with phone numbers, statement of specific teaching and scholarship/research interests. No portfolio with initial application. **Deadline - February 1, 1992.** Equal Opportunity/Affirmative Action Employer. Write: Professor Ivan Zaknic, Chair, Dept. of Art and Architecture Lehigh University, Chandler-Ullman #17, Bethlehem, PA 18015.

USC ARCHITECTURE

University of Southern California

invites nominations and expressions of interest for the position of

Dean of the School of Architecture

The dean will provide strong leadership in the school's development and in its external relations. The faculty of the School reflects varied perspectives in the field and seeks to maintain the differences that are its strength.

The University is on of the nation's leading centers of teaching and research. It is located near the center of metropolitan Los Angeles.

The search committee plans to begin its formal screening in **December 1991.** The position becomes available **July 1, 1992.** Nominations and expressions of interest will be received until the position is filled. They should be submitted to:

Professor Marshall Cohen
Dean of Humanities
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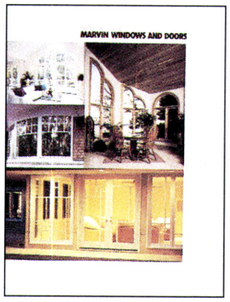
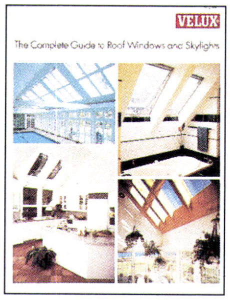


Marvin Windows residential catalog details Marvin's complete line of wood and clad wood windows and patio doors. The 92-page catalog contains over 140 color photographs and information on Marvin's newest products such as the corner window. Easy to read construction details and standard sizes are included for each product. **Marvin Windows.** Circle No. 358



New 1991 edition of *The Complete Guide to Roof Windows and Skylights* from Velux features design ideas and helpful hints for building and remodeling professionals. Included is information on installation, building shafts, choosing models, sizes and accessories, and new product offerings for 1991. **Velux-America Inc.** Circle No. 360

Accent residential landscapes with contemporary outdoor lighting forms of solid California redwood. Select from wall, path, post, and bollard styles. These fixtures are all U.L.-approved for wet locations. Incandescent, fluorescent, high-intensity discharge, and low-voltage modes are available. **WoodForm, Inc.** Circle No. 362

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(continued from page 146)

and locksets: Baldwin. Oven and range: Gaggenau. Refrigerator: Traulsen. Door and window security: Westpac. Forced air units: Lennox 'Pulse-Air.' Assorted Eames chairs: Knoll. Custom study desk: Morphosis. Dining room table: Paul Tuttle Designer. Custom Cabinetry: Starbuck-Minikin. Blinds and roman shades: Levolor, Fred Hayward. Chrome towel bars and mirror supports: Tom Farrage & Co. Steel fireplace fabrication: Metalmorphosis.

Project: Summers House, Santa Monica, California (p. 64). *Architects: Mack Architects, San Francisco.* Stucco: La Habra Stucco. Integrally colored plaster: Mares Manufacturing. Curb-mounted glass: Rekord Windows. Skylight: O'Keefe Skylights. Standing metal seam roofing: Custom Bilt. Waterproof deck: Gacodeck by Gates Eng. Built-up Roof: Manville. Semitransparent wood stain: Cabot. Interior paint: Fuller O'Brien. Butt hinges: Stanley. Locksets: Schlage. Intercom: Siedle-Vario. Recessed step lighting: Bega. Exterior light sconces: Shaper. Recessed interior lighting: Halo. Interior light sconces: Artemide. Lavatory: Bates. Tubs and water closets: American Standard. Steam generator: Mr. Steam. Plumbing fittings and shower heads: Chicago Faucets.

Project: Studio Prototype House, Toronto, Canada. (p. 75). *Architect: Steven Fong, Toronto.* 12" CMU foundation walls: T.G.S.. Micro-lam beams: Trus-Joist Canada. Rafter hangers: Simpson Strong Tie. Exterior stucco system: Gemite Products. Wood windows and doors: Charles Sammut. Fixed skylights: Lexuco. Single-ply roofing: US Intec. Corrugated galvanized roofing: Jannock Steel Fabrication. EPS insulation: Plasti-Fab. Roof insulation: Dow Chemical. Paint: Pratt & Lambert. Hinges: Stanley Canada. Locksets: Schlage. Faucets: Grohe. Appliances: Gaggeneau. Sink: Franke. Steel-tube stair: Regina Steel. Outdoor lighting: Rab. Interior lighting: Halo. Lavatories and water closets: American Standard. Plumbing fixtures: Grohe. Electric heaters: Modine.

Project: Schreyer Residence, Healdsburg, California (p. 78). *Architects: Jennings & Stout Architects, San Francisco.* Concrete foundation: McPhail. Veneer gypsum plaster: USG. Aluminum skylights: O'Keeffe. Garage doors: Jones Garage Door. Terrazzo: Mares Mfg. Fiberglass insulation: Owens Corning. Roof drains: Josam. Paint: Anderson Paint. Door hardware: Baldwin. Door closers: Rixson-Firemark. Kitchen cabinets: Boffi. Countertops: Dupont. Refrigerator: Sub Zero. Dishwasher: KitchenAid. Ovens: Thermador. Carpet: Rodeo Mills. Lamps: Serrasar. Custom furniture: Philipe Gurrey, Chris Wilhelmsen, Marco. Custom cabinets: Steinback Cabinet Shop. Dining chairs: ICF. Outdoor furniture: Terra. Outdoor dining chairs: Mirak. Venetian blinds: Ace Venetian Blind. Drapery hardware: Donghia. Upholstery fabric: Clarence House. Leather: Spinneybeck. Rubber stair treads: Pirelli. Custom steel handrails: Chris Wilhelmsen. Low-voltage exterior lighting: Loran. Low-voltage interior lighting: Lightolier. Electrical devices: Lutron. Electrical outlets: Leviton. Sinks: Franke. Plumbing fittings/bathroom accessories: Kroin. Heat pump: Carrier. Grilles: Titus. Thermostats: Honeywell.

Project: Goldstein house, Los Angeles (p. 88). *Architect: John Lautner, FAIA, Los Angeles.* Structure: reinforced concrete, steel, wood. Interior walls: exposed concrete, bubinga, redwood, leather, mirrors. Floors: exposed-aggregate concrete, bubinga wood. Ceilings: redwood, concrete. Roof: built-up, copper, and concrete. Skylights, motorized clear acrylic: Rollamatic. Magnetic induction kitchen range: Kasar. Television and stereo: Bang & Olufsen.

P/A ADVERTISERS' INDEX NOVEMBER 1991

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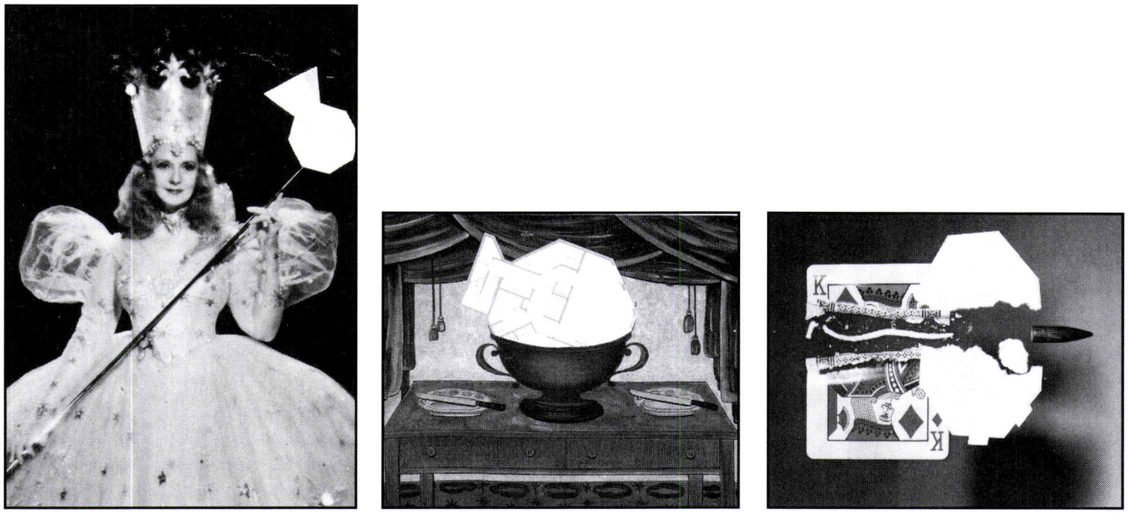

A sampling of the 97 postcards sent as a comment on the P/A Awards program.

P/A Awards: Anonymous Critique

In September, the P/A mailroom, which was already straining to handle the flood of entries in our awards program, had another small deluge to contend with. Some 97 postcards, sent anonymously with postmarks from around the world, arrived addressed to the Awards Editor. Each of the postcards, which depicted subjects ranging from high art to high camp, had been altered to include an unidentified octagonal house plan. On the reverse sides were equally diverse texts – quotes from Hegel, Dr. Seuss, and Shakespeare, advertising copy, clippings from instruction manuals. Each card bore the stamped words "Mood Indigo."

It didn't take us long to figure out that the postcards represented some kind of comment on the awards program, but we didn't know just what until we tracked down one of the perpetrators. (A little steam revealed a previous address on one of the postcards.) He said that "Mood Indigo" was a group of Los Angeles architects who were distressed at seeing the amount of time, effort, and money that local architects expended on presentations for the awards program. (For our part, we were pleased to hear we were providing work for someone in this climate.) The postcards, which parodied awards submissions by presenting a banal plan (clipped from a supermarket stock-plan book) in exotic ways, were intended as a reminder that architecture should be about building, not presentation.

The architects responsible have asked to remain anonymous, since they feel that receiving publicity for a critique of publicity-seeking architects would be inappropriate. The irony, of course, is that like most critics of media, the group had to depend on the media to report their action. If 97 postcards fall in our mailbox and we don't report it, do they make a sound?

Best Supporting Magazine

Mood Indigo would probably be appalled to hear it, but some of us at P/A harbor secret dreams of being famous, even though our delusions of fame disappeared after enough acquaintances asked us if we were "still working for, uh, *Architectural Digest*, is it?" Still, we cling to any sign that our name may be entering the public consciousness, so we rushed to see Terry Gilliam's film *The Fisher King* when we heard that P/A figured somehow in the plot.

Gilliam, who appropriated a Ricardo Bofill housing block to represent a totalitarian state in *Brazil* (P/A, March 1986, p. 21), uses the architecture of New York to splendid effect in *The Fisher King*. Fine supporting roles are played by the castellated armory at 94th and Madison, the Metropolitan Life building, Grand Central Terminal, Central Park, and the anchorages of the Manhattan Bridge.

And as for our 15 minutes of fame? It's more like five seconds, and it occurs when Robin Williams shows Jeff Bridges what he says is a copy of P/A in order to prove that he has discovered the Holy Grail in an Upper East Side mansion (the armory). But the spread that appears on screen is not very P/A-like; it looks more like something from, well, *Architectural Digest*. ■

Tri-Star Pictures

Robin Williams, Jeff Bridges, and the armory in The Fisher King.

P/A in December . . .

John Morris Dixon celebrates his 20th anniversary as Editor of P/A with a "scrapbook" reflecting on the highlights of the last two decades in architecture. Also featured:

. . . London's new Stansted Airport by Foster Associates

. . . an inquiry on factories

. . . a pair of office interiors in New York by Kohn Pedersen Fox Conway.

In the Technics department will be articles on exterior paints and stains, structural values of wood, and a Diagnostic Clinic on tile failures. The December issue will also feature an update on the progress of the winning entry in P/A's Affordable Housing Initiative (P/A, June 1991, p. 74).